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VIEWS, NEWS AND INTERVIEWS.

"I've been reading with interest and satisfaction your well-timed shots at the engineer who takes commissions," said an observant man. "The position of an engineer who calmly collects his salary from his employer and then goes across the street and gets his little bribe from a manufacturer reminds me of a story I read the other day. A man owned a dog which had a remarkable pair of eyes; one was considerably larger than the other. A favorite trick of the dog was exhibited whenever the man had a guest to dine with him. The dog would get fed on one side of the guest then go around to the other side, pretend to be another dog and look hungry."

During 1895 the United States produced 170,962,607 pounds of copper, valued in New York city at $18,292,999.

Mr. P. A. B. Widener, the street railway magnate, who is said to have taken an interest in the Siemens & Halske Electric Company, of America, is quoted as saying: "There are two great concerns now, the General Electric and the Westinghouse, and if they were to be 50 times as large as they are, they could not cover the country. To give you my honest opinion, I believe there is room for a third, or a fourth, or a fifth, or a sixth, or even more, as the field widens, which it is bound to do."

A curious accident is reported from Grand Rapids, Mich. A little girl was playing at the corner of a street, when a lamp trimmer threw a carbon from the top of the electric light tower. The missile fell 150 feet, striking the child's right eye and destroying the sight.

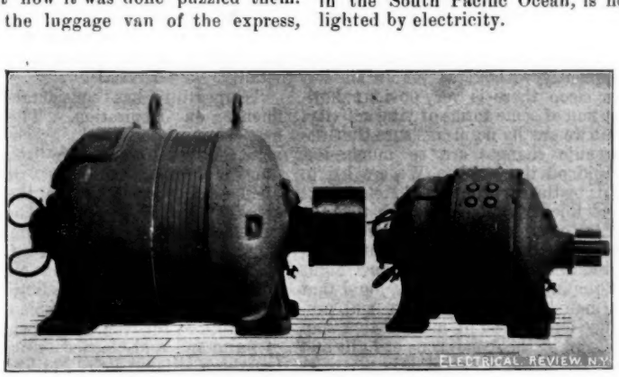
J. M. Davis, of Greensburg, Kas., who was a member of the dual State legislature during the memorable sessions of 1893, stated in a recent interview that the population of that town had dwindled from 2,500 five years ago to 125. The bonded indebtedness of the city incurred in the establishment of waterworks, electric lighting and other internal improvements is $45,000. Farmers have bought up the majority of the houses for a song and moved them away, and the handful of people that still remain refuse to pay taxes. The outstanding bonds are worthless.

The Belgian customs authorities have known for a long time that large quantities of jewelry were smuggled over the French border, but how it was done puzzled them. In the luggage van of the express, which runs between Paris and Brussels, is a case which holds the accumulators when the train is electrically lighted. A key of the case is held by the conductor of the express, a foreman porter and an excise official of the border station, but none of these ever appear to use it. The other day, as the train ran into Quèvy, the border town, a customs inspector took it into his head, more from officiousness than suspicion, to open the chest. To his amazement the case was filled to the lid with watches, chains, rings, bracelets and all kinds of dutiable jewelry to the value of over $1,500. It was found that the foreman porter at Quèvy had, for a long period, been carrying on a contraband traffic for a well-known Paris jeweler, who, it is said, has had to disgorge heavily, both in jewelry and hard cash, in consequence of the disclosure of his frauds.

It was reported last week that the district attorney of New York city had received information that Walter K. Freeman, the electrician who is confined in the Tombs on a charge of criminal assault and abduction, would shortly attempt to escape from jail.

The amount of money spent for advertising in street cars in the United States has, in five years, grown from $300,000 to $3,000,000 and is increasing rapidly.

Tahiti, one of the Society Islands in the South Pacific Ocean, is now lighted by electricity.



Elwell-Parker Stationary Motors.

Elwell-Parker Stationary Motors.

The Elwell-Parker Electric Company of America, of Cleveland, Ohio, has devised a novel type of stationary motor, shown in the accompanying illustration. A three horse-power and a 12 horse-power multipolar series motor are shown, but the company also builds these machines shunt wound. The pole pieces are built up of disks cut from wrought iron. The end pieces carrying the bearings are made of cast-iron. There are three bearings on the armature shaft, allowing the armature to be taken out without disturbing the belt. The belt pull is distributed on two bearings. The lubrication of the bearings is very thorough.

This type of construction permits the same castings to be used for several sizes of machines and has the additional advantage of being inexpensive. These machines are said to be very efficient.

RESPIRATION, SUFFOCATION AND RESUSCITATION.

THE MAIN PHYSIOLOGICAL FACTORS WHICH PLAY THE RÔLE IN RESPIRATION, SUFFOCATION AND RESUSCITATION, AND THE AUTHOR'S METHOD OF PNEUMATIC ARTIFICIAL RESPIRATION.

BY J. MOUNT BLEYER, M.D., F.R.A.M.S. (NAPLES, ITALY), OF NEW YORK CITY. ORIGINAL COMMUNICATION TO THE ACADEMIA DE CIENCIAS MEDICAS, FISICAS Y NATURALES DE LA HABANA, 1895.

Laryngologist to the German West-Side Clinic; Membre de la Societe Francaise de Otologie de Laryngologie et de Rhinologie, Paris; Membre National Academy of Medicine, Mexico; Membre de la Societe Francaise D' Electrotherapie, Paris; Member of the American Medical Association, etc.

(*Concluded from page 137.*)

Why is death inevitable when the access of fresh oxygen is excluded? The fact we know—of the reason we are ignorant. There still remains a large quantity of oxygen in the blood of the expiring animal; nor will death be sensibly retarded if fresh oxygen is injected into the veins and arteries. How is this? The process of Respiration brings oxygen to the blood; yet, if the oxygen be brought there through a more direct channel while respiration is impeded, the animal will die as quickly as if left to itself. Bernard tied a dog's head in a bag, which would in a certain time produce suffocation, and he found that period by no means retarded when he injected oxygen into the arteries.

Quitting for a moment this labyrinth of difficulty and doubt, which alternately fascinates and disheartens us when we strive to gain some explanation of the myriad processes of Life, let us stand apart and contemplate the marvel of respiratory interchange no longer as an animal function, but rather as a planetary phenomenon; let us endeavor to picture to ourselves the silent creative activity everywhere dependent on this interchange. The forests, the prairies, the meadows, the corn-fields and gardens—the mighty expanse of plant life covering mountain and valley—subsist on the carbonic acid which is exhaled from the lungs and bodies of animals. Plants take up this carbonic acid from the atmosphere, mould the carbon into their own substance, and set free the oxygen, once more returning it to the atmosphere. Animals reverse the process, taking up the oxygen and giving out carbonic acid for the nourishment of plants. This beautiful rhythmus of organic life has been so often described, that it has almost become commonplace, without, however, losing its charm for the contemplative mind. The

dependence of plant on animal and of animal on plant, united in one mystery, and ever acting each for the advantage of the other, is not an idea to lose its charm by becoming familiar; but it sometimes leads to misconception. What, for instance, seems more natural than that the influence of trees planted in our cities should be very beneficial? If trees can thus withdraw the noxious carbonic acid from the vitiated air of cities, would it not be desirable—nay, ought it not peremptorily to be demanded—that as many trees should be planted in our streets as we can find room for? Such conclusions are soon reached by swift logicians. But Nature is apt to elude the grasp of swift logicians, and she repeatedly declines to fall into the symmetrical of their formulas. Not that Nature is capricious or illogical, but logicians are apt to draw inferences before they have collected sufficient data. Nature, in the present case, point-blank declares that the influence of vegetation on the atmosphere is totally inappreciable, unless the atmosphere be in a closed chamber or vessel, and then the influence is striking. Human wit has discovered no test delicate enough to appreciate the influence of plants on the free atmosphere in which we live. The depth and compass of this air-ocean are too vast and the amount of oxygen absorbed by animals too trivial in comparison for any effect to be appreciable; moreover, the mixture of the gases in the air and their mutual diffusion is so rapid that no difference has yet been detected in the proportions of oxygen and carbonic acid in the air of crowded cities, towns or wooded valleys.

The air of cities will hold more noxious exhalations suspended in it, but its gaseous composition will be the same as that of the country. To give an idea of the insignificant part played by animals as vitiators of the great air-ocean, we may mention the calculation made by the distinguished chemist Dumas, that all the oxygen consumed by all the animals on the surface of the globe during 100 years would not amount to more than $\frac{1}{3000}$ of the quanity in our atmosphere; and even supposing all vegetation to be annihilated, consequently no oxygen to be returned to the air by the incessant reduction of the carbonic acid, there would still be needed a period of 10,000 years before the diminution of the oxygen could become appreciable by any instruments we have hitherto invented.

After having thus described the essential characters and conditions of the respiratory process, it will be interesting to glance at the results obtained by various investigators respecting the variations among different animals, and in different states of the same animal. We learn, for example, without surprise, that animals of large bulk consume more air than the smaller animal; horses and oxen more than men; men more than dogs and cats. But to use an Eastern figure, it raises the eyebrows of astonishment when we learn that the proportion of carbonic acid exhaled by a man and a horse bears no sort of correspondence to the differences in their relative bulk—the proportion being 187 to 16. We are, in like manner, puzzled to find that a full-grown cat only exhales one and two-thirds of carbonic acid, where a rabbit more than two. How is this to be explained? Is there not a streak of light trembling on this question when we bring forward the fact previously mentioned, that the vegetable feeders uniformly exhale more carbonic acid than the animal feeders, and that carniverous animals exhale more than their usual quantity if they are fed on vegetables? Some light may fall from this source, but it does not suffice to clear up the obscurity. Another interesting problem also arises here. Although the larger the animal the greater is the absolute amount of carbonic acid it produces,* yet the smaller the animal the greater is the relative amount it produces. Thus, supposing the production of carbonic acid be estimated according to each pound weight of the animal, then we shall find that the smaller the animal the greater will be its proportion. But it is not size and weight alone which determine the difference in the amount of air consumed; far greater differences will arise from the varieties of organization. We may accept it as an axiom in physiology that the activity of respiration is inseparably connected with vital activity; not simply muscular activity, as some writers maintain, but all processes whatever involving chemical within the body. The most striking confirmation of this axiom is perhaps to be seen in the phenomena of hibernation or Winter sleep. No sooner are the vital functions reduced to this extremely feeble condition, in which we may almost say life is suspended, than these hibernating animals are so incapable of ordinary respiration that they may be placed in an atmosphere of pure carbonic acid and remain there unhurt for four hours; whereas if they were placed in such an atmosphere when their breathing was going on they would instantly perish.

One would imagine, on hearing this, that our ordinary sleep would also bring with it a diminution of the quantity of air consumed. And in as far as sleep may be considered a diminution of the vital activity, such a conclusion must be correct. But in how far is sleep a diminution? That is a question not hitherto asked, consequently without as yet an answer. In sleep there is very obvious diminution of some forms of vital activity, but we are by no means sure that the organic changes are so much less rapid on the whole. We are led to this by the experiments of Molesschott and Böcker, which establish that the chief cause of the difference noticed between the amount of carbonic acid produced during the day and night is the influence of *sunlight;* and that a man lying quietly awake will produce less instead of more than a man asleep, if the conditions of light and temperature are the same. Sleep, *as* sleep, is not, therefore, a diminution of the vital activity; although the sleep which we take at night after the fatigues of the day must, of course, be considered as accompanied by a diminution. It is quite certain that, partly from fatigue and partly from the absence of sunlight, less carbonic acid is formed at night than during the day. Boussingault found that the same turtle-doves during day and night showed a difference of 94 and 59 on one occasion, and of 75 and 53 on another. Lehmann confirmed the observations.

If it be true that all vital activity increases the amount of carbonic acid exhaled, and if every diminution be accompanied by a corresponding diminution of the amount, we may readily believe that intellectual fatigue and the lassitude which succeeds mental or emotional excitement will be accompanied by a corresponding depression of the respiratory function. Nay, even the concentration of the mind on any subject will produce this. Every one knows the state of "breathless attention." Whenever the mind is preoccupied by a powerful impression of some duration, the breathing becomes so feeble that from time to time we are forced to compensate this diminished activity by a deep inspiration. This is the rationale of *sighing*, an action commonly attributed only to grief, but which is the accompaniment of all mental preoccupation. The philosopher brooding over his problems will be heard sighing from time to time almost as deeply as the maiden brooding over her forlorn condition. All men sigh over their work, when their work deeply engages them; but they do not remark it, because the work, and not their feelings, engages their attention, whereas during grief it is their feelings which occupy them.

It is an interesting fact, and one which throws light on the intimate connection between respiration and vital activity, that a very considerable increase in the production of carbonic acid swiftly follows after eating; consequently an enormous reduction in the amount is found to accompany starvation. The fact was established by Spallanzani, and has been repeatedly confirmed. Boussingault found that pigeons, when fasting, did not produce half the amount which they produced when well fed. Spallanzani suggests that the food during digestion gives off carbonic acid, and this passing into the blood is exhaled in respiration; a suggestion which receives additional force from the fact that vegetable food uniformly produces more carbonic acid in respiration than animal food. But this will scarcely account for the whole of the increase and we are led to seek in the greater activity of the nutritive processes for the other cause thereof; the fasting animal has a depressed vitality.

Temperature has considerable influence on respiration. The fact has been ascertained by experiment, but it might have been deductively established; for the influence of temperature on the vital activities is well known, and whatever influences them must effect respiration. It is only by the aid of such an axiom that we can find our way amid the apparent contradictions of this subject. The remarkable difference noticed between the capabilities of warm and cold-blooded animals in breathing vitiated air is not less than the difference in the effect of temperature on these two classes. We remember our astonishment on learning from Spallanzani that increase in the temperature brings with it an uniform increase in the amount of oxygen absorbed by mollusks and reptiles; it was a statement in direct contradiction to the well-established fact in human physiology that more oxygen was absorbed in cold than in hot weather. Our difficulty was lightened, however, when we learned that Spallanzani's statement is only true of cold-blooded animals and true of them only within certain limits; too great a heat ceases to increase the amount and gradually diminishes it, as with warm-blooded animals. What are these limits and why this cessation of increase? The limits are these: Take a frog and place it in an atmosphere a little above the freezing point; as the temperature rises from 36 degrees to 45 degrees Fahrenheit, the amount of oxygen absorbed uniformly increases; it remains nearly stationary from 45 degrees to 57 degrees; at 58 degrees it begins to decrease, and this decrease continues until 104 degrees are reached and then the frog perishes. The reason is very simple: A certain amount of heat stimulates all the vital functions of the frog and consequently increases its need for oxygen. When the heat becomes too great it ceases to be a stimulant and depresses the functional activity, till at length a point is reached when the organism can no longer exist.

On warm-blooded animals, the effect of temperature is apparently different, but really the same. Every increase of heat is found to diminish their respiration, every increase of cold to augment it. Thus it is ascertained that the smaller mammals, at a temperature of 86 degrees to 104 degrees, Fahrenheit, consume one-half the quantity they consumed at freezing point. Various experiments on man have elicited the general fact, that under the influence of a moderately cold atmosphere the respiration is increased by one-sixth more than in a moderately warm atmosphere. Precisely as too intense a degree of heat diminishes the respiration of the frog, by enfeebling its vital activity, does too intense a degree of cold diminish the respiration of a warm-blooded animal by enfeebling its vital activity. There are certain limits of temperature within which every increase of heat raises the respiration of the frog, because the increase raises its vital activity; but if these limits be overstepped the stimulant is changed into a debilitant.

We see this very curiously illustrated by the hybernating animals, the dormouse, marmot, bat, hedgehog, etc. They occupy, in this respect, an intermediate position, between the cold-blooded and warm-blooded animals; for although they are really warm-blooded animals, the effect of temperature on them is closely allied to that produced on the cold-blooded. No sooner is there a fall of external temperature than their respiration diminishes. Unlike the rest of warm-blooded animals, their organism seems to have little power of resisting the changes of external temperature; they cannot produce heat with sufficient rapidity to counter-balance the loss they sustain from the surface of their bodies when the air is cold. Instead of acting on them as a stimulus, which would accelerate the respiratory process, cold acts on them with a depressing influence which gradually reduces their respiration almost to zero. But no sooner have they passed into this Winter sleep, and their organic activity has become almost null, than we can at pleasure reawaken it to any degree by raising the surrounding temperature, and as the vital activity once more begins to manifest itself, the respiration (which is only one form thereof) likewise becomes manifest.

Why do we breathe?

The foregoing pages have given some answer to the question, *How* do we breathe? but have not hinted at the why; yet after reading about the respiratory process, a natural curiosity prompts the inquiry as to its cause. Unhappily, nothing but extremely vague answers can be given. We know that the chest expands and contracts with beautiful rhythm, and mostly as an involuntary automatic process. We know that our attention is not required, that no effort is needed, and, indeed, that no effort of ours can prevent the regular alternation of inspiration and expiration. We can by an effort accelerate or retard these motions, but we cannot prevent them. The process, then, clearly depends on a stimulus given to the involuntary part of the nervous system; it is called into action by nervous stimulus, and physiologists have vainly endeavored to discover the nervous apparatus which is involved and the rationale of its action. The pressure of carbonic acid in the

* This applies, of course, only to animals of the same kind. "Vous serez étonné," says Spallanzani, "quand je vous dirai qu' une larve du poids de quelques grains s'appropri presqu' autant d' oxygéne dans le même tems qu'un amphibie mille fois plus volumineux qu'elle."—Mémoires sur la Resp., p. 69. This is because the insect lives so much more rapidly than the reptile.

air cells, or of venous blood in the capillaries, may act as a stimulus to the pneumogastric nerve; but what is the rationale of whipping a newly-born child's back and continuation, as a means of making it draw breath? Generally the stimulus of the cold air on the child's face suffices to make it draw breath, which it expires again in a well-known cry, to mother's ears most musical; but this stimulus is often insufficient, and the doctor or nurse initiates the little stranger into that experience of "external local applications," which, in later years, will also be freely used as a stimulus to virtue or learning. The fact we know, but why such "local applications" excite the respiratory activity, we do not know, for we do not know the nervous apparatus which regulates the actions of respiration. It is probable that the researches of physiologists will, ere long, clear up this point, as they have cleared up so many others; meanwhile we must content ourselves with vague answers to our question, "Why do we breathe?"

460 Lexington Ave., New York.

Thieves—The Commission Kind.

[*From the Street Railway Journal.*]

There are many kinds of thieves in the world and many degrees of culpability in thievery. The half-starved child who steals a loaf of bread in its desperation and misery is universally pitied, not blamed. The able-bodied man who cannot, in hard times, find work to do, is punished, indeed, for an attempt to maintain life at the expense of others, but sympathy for him is not wholly withheld. The daring and ingenious burglar who schemes for months to rob a bank and who gains his ends, if at all, at the deadly risk of life and liberty, often commands admiration almost as much as fear. The sneak thief is the coyote of the kingdom of thieves—shunned and despised by all, even of his own general species. But what can measure the utter contempt felt by every right-minded and honorable man for that form of sneak thievery which involves the betrayal of trust—such a thievery, for example, as is committed when "commissions" upon purchases for corporations or firms are sought for or accepted by the purchasing agent? How can such thievery be justified to the consciences of men who are sometimes (though not often, we fear) proof against most other forms of temptation. They know, and must of necessity know, that whatever moneys are paid to them by a manufacturer are really taken out of the pocket of their own employers. They know, and must of necessity know, that no official action by themselves which cannot be frankly told to their employers can be manly or honest. They know, and must of necessity know, that however upright and honorable they may appear to be to the world at large, they are nevertheless despised by, and are actually in the life-long power of, the men who are using them as catspaws, and who, among their own associates, do not hesitate to openly and contemptuously sneer at these "takers of commissions" as the "thieves," which they really are. How any man, however weak, can be drawn into such a position as this we do not see. Detection is sooner or later absolutely certain. Such things cannot permanently be concealed. Too many people are cognizant of the facts, and the criminal once detected is branded for life.

There is another side to this question, and one which, while it is not an excuse, is perhaps oftentimes a reason for the acceptance of commissions. The large number of trained and partially trained engineers who have flocked into this street railway field during the last few years has made the conditions of competition for positions with street railway companies such that the salaries paid are too small for the service rendered. These young men are often well educated and have expensive tastes, together with some social standing and aspirations. Where this is the case they are received cordially in cities to which they go, and it is generally supposed that they are receiving salaries commensurate with their abilities. Under these circumstances, the temptation to add to income by "doing what every one else is doing" may easily become too great to be resisted. What is true of engineers is true also of street railway managers themselves in too many cases; that is, they are not paid salaries equivalent to the cares and responsibilities which are placed upon them, nor sufficient to overcome the temptation to make up these salaries in an illegitimate way. The remedy lies with the street railway companies, and it may be said, broadly, that the money saved in salaries may be taken from another pocket many times over.

KIND WORDS.

"ALWAYS UP TO THE TIMES."

To the Editor of Electrical Review:

I find the Electrical Review always up to the times and find it a great help to electricians as well as others. H. H. C. Smith.

Allentown, Pa., August 31.

"CAN'T DO WITHOUT IT."

To the Editor of Electrical Review:

I hate to have to ask you to change my address so often, but I feel that I *can't* do without the Electrical Review now, as it seems an essential member in my business and I shall always wish it the best of success.

Yours ever, P. E. J.

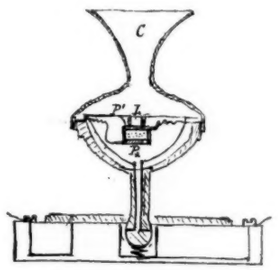
Chester, S. C., August 28.

A Cool-Headed Driver.

At West Newton, Mass., the other day, while the car men were absent, some children boarded an electric car and put the trolley on the wire. The power was turned on and in an instant the car was off at full speed. The children jumped and ran before they could be identified. The car sped on, teams and passengers scattering before it. Another car was on the same track only a short distance away and a collision seemed inevitable. Frank Rawson, a driver, was standing in front of the power house, and as the car rushed by he leaped aboard and pulled the trolley from the wire.

The Carbonnelle Telephone System.

The readers of the Electrical Review doubtless recall the description of the Carbonnelle microphone and system which we published in our issues of February 20 and April 24, respectively. In the former article, we gave full details of the system proposed by M. Carbonnelle, and quoted the statements which originally appeared in the issue of *L'Industrie Electrique*, one of our esteemed French exchanges. Special attention was also called to the high resistance feature of the microphone, measuring 1,000 ohms when at rest, and increasing during operation to 8,000 ohms. Whether or not this peculiarity is advantageous from a microphonic point is an open question; the absence, however, of an induction coil, and the massing or centralization of battery power at *one* point, the really essential and characteristic feature of the Carbonnelle system, may rightfully claim the attention of all



The Carbonelle Transmitter.—Two Carbon Plates P^1 and P^2, Between Them Powdered Carbon. L is a Rubber Block Firmly Attached to the Diaphragm. The Whole Transmitter is Movable.

thoughtful and progressive telephonists.

Indeed, the centralization of battery power is as essential to all future large telephone centrals as is to-day the supply of thousands of electric lights from a common central source. The present use of an individual battery at each subscriber's station to energize the transmitter, is not only illogical, but wasteful in the extreme, and, instead of being a source of electrical supply, it might more correctly be called a "source of endless troubles."

There is no necessity for an individual battery. Indeed, quite early in the history of the telephone, Mr. T. B. Doolittle took out a patent for a "common battery system," and the reason why this arrangement did not gain favor with the telephone companies, both in the United States and on the Continent, is the fact that the ordinary microphone is not well adapted for such a system. Since then a great many patents have issued, especially in the United States, most of which describe circuits that have been found to possess advantages in connection with common battery systems. Those of our readers who are interested in this work may well consult the several patents issued to Messrs. Price and Barrett, A. G. Bell, G. L. Wiley, A. C. White, John S. Stone and other American telephone engineers.

The amount of electrical energy saved by the employment of the Carbonelle system is claimed to be considerable, and a simple computation shows that this assertion is true, assuming that the data which have been published so far are reliable. In this connection it is interesting to note the opinion of M. Banneux.

Since the first publication, little has been heard about the Carbonnelle system. It appears, however, that the inventor has not been idle; on the contrary, the latest information, gathered from European exchanges, proves that he has succeeded in inducing the Belgian Telegraph Administration to make a practical test of the merits of his invention.

On July 1, 1895, the Belgian Telegraph Administration opened an exchange at Soignies, arranged on the Carbonnelle system; *i. e.*, at the subscriber's station there is merely a transmitter, the usual induction coil and battery being omitted. At present 28 such installations are in actual operation. Two Leclanche batteries are included in each of the four pair of flexible cords which at the exchange serve to connect these subscribers with the other local exchange subscribers or with those of Soignies and Mons exchanges. The minimum line distance is 31 miles. As all interurban Belgian lines are constructed on the Van Rysselberghe plan for simultaneous telegraphy and telephony, there is also a fifth pair of cords at the exchange energized by five Leclanche batteries, or a total of 13 batteries for 30 subscribers. Of course the saving of electrical energy for a small number of subscribers is trifling compared with the saving of operating expenses inherent in the use of the Carbonnelle system when applied to a large central where a set of accumulators will be found sufficient to supply the necessary electrical energy.

At present each Belgian exchange subscriber has a battery, consequently each conversation requires the cooperation of two cells, each working through a maximum resistance of 25 ohms, while in the Carbonnelle arrangement the minimum resistance of a microphone at rest is 5,000 ohms, which, when working, increases rapidly to 25,000 ohms.

From the above it is evident that the actual use of electrical energy during a conversation between two subscribers must be insignificant; on the other hand the amount of energy saved, especially in a large central where several hundred thousand conversations are demanded daily, should constitute an important factor in the operating expense of every telephone administration. We intend to keep our readers informed as to the outcome of the experiment of the Belgian telegraph administration.

The Baltimore Electric Locomotive.

The Boston *Evening Herald* recently stated that the electric locomotive now in operation in the Baltimore Belt Line tunnel was a failure. This is not true. The locomotive, while it has not yet been accepted by the Baltimore & Ohio Railroad Company, is working in a thoroughly successful manner.

ON MAGNETIC POTENTIAL.

BY FREDERICK BEDELL IN THE "PHYSICAL REVIEW."

In 1882, Professor Clausius* discussed at length the dimensional formulas of the electro-static and electro-magnetic systems, and derived the dimensions for magnetic pole (m) from a consideration of the equivalence of a magnetic shell and a circuit carrying a current of electricity, as first pointed out by Ampere; thus—

(1) Area × current = magnetic moment = ml.

In the electro-magnetic system, this gives a magnetic pole the dimensions $M^{\frac{1}{2}}L^{\frac{3}{2}}T^{-1}$, which accords with Maxwell and subsequent writers. In the electro-static system, however, this gives to magnetic pole the dimensions $M^{\frac{1}{2}}L^{\frac{5}{2}}T^{-2}$, for which Maxwell gives $M^{\frac{1}{2}}L^{\frac{1}{2}}$. The reasoning of Clausius was apparently correct, and he concluded Maxwell was in error. This conclusion was indorsed by Professor Everett.† The discussion‡ which followed "On the Dimensions of a Magnetic Pole in the Electro-static System of Units" needs merely a mention here.

Professor J. J. Thomson pointed out that the equivalence of a circuit and a magnetic shell, as given by Ampere, is correct only in a medium with permeability equal to unity. The factor μ, denoting the permeability of the medium, should be introduced into the general statement, and (1) should be written—

(2) μ × current × area = magnetic moment.

In the electro-static system μ has the dimensions $M^0L^{-2}T^2$; hence m has the dimensions $M^{\frac{1}{2}}L^{\frac{1}{2}}$, as given by Maxwell. In the electro-magnetic system, permeability is a number without dimensions, and the presence of μ as a factor in (2) does not affect the dimensions of m. Professor Thomson derived these same dimensions from the expression for the work done in carrying a pole around a circuit. He also pointed out that the factor μ should enter into the expression for the attraction between magnetic poles; thus—

$$(3) \qquad f = \frac{mm'}{\mu r^2}.$$

Professor Clausius, however, still considered that he was correct, maintaining that, if a circuit and magnetic shell are equivalent, they must be mutually replaceable, and that a change in the medium would affect one as the other. Professor Everett subsequently concluded that Maxwell was correct, obtaining the dimensions of Maxwell from the galvanometer law and the law of Faraday, although he did not see wherein Clausius was wrong in obtaining his results from the equivalence of a circuit and a magnetic shell. Helmholtz,§ too, showed lack of confidence in the equivalence of the magnetic shell, and stated that the Ampere-Weber hypothesis must be looked upon as neither verified or even completely worked out. He gave no consideration to the nature of the medium, which, as Professor Thomson pointed out, has a most important bearing on the question. It was left for Dr. Lodge to point out that a distinction should be made between the permeabilities of the medium of the space corresponding to the space of the equivalent shell and of the exterior medium. It was he who pointed out that the magnetic moment of a circuit is equal to the product of the current, the effective area, and the permeability of the *interior* space; the magnetic moment is entirely independent of the permeability of the surrounding space. The failure to recognize this fact was the cause of the erroneous views which had been set forth by such distinguished scientists.

It is the purpose of this paper to consider the effect of permeability upon the magnetic potential due to a magnet or a current of electricity, and to show more definitely the bearing of some of the above relations.

THE DIMENSIONS OF MAGNETIC POTENTIAL.

The expressions for the magnetic potential at a point, as ordinarily given, are

(4) magnetic potential due to a magnet = $$V = \Sigma\frac{m}{r};$$

(5) magnetic potential due to a current = $$V = I\Omega.$$

In (5) I denotes the current, and Ω denotes the solid angle subtended by the circuit at the point, the potential of which is under consideration.

In the electro-magnetic system these equations lead to the following dimensions for magnetic potentials:—

6)[from(4)] $$V = \frac{m}{r} = \frac{M^{\frac{1}{2}}L^{\frac{3}{2}}T^{-1}}{L} = M^{\frac{1}{2}}L^{\frac{1}{2}}T^{-1};$$

7) [from (5)] $$V = I\Omega = M^{\frac{1}{2}}L^{\frac{1}{2}}T^{-1}.$$

These equations (6 and 7) agree with each other and with the dimensions for magnetic potential in the electro-magnetic system as usually given, and will be found correct.

In the electro-static system, equations (4) and (5) give the dimensions:

(8) [from (4)] $$V = \frac{m}{r} = \frac{M^{\frac{1}{2}}L^{\frac{1}{2}}}{L} = M^{\frac{1}{2}}L^{-\frac{1}{2}};$$

(9) [from (5)] $$V = I\Omega = M^{\frac{1}{2}}L^{\frac{3}{2}}T^{-2}.$$

These equations (8) and (9) are not concordant, although derived from (4) and (5), which gave correct results in the electro-magnetic system. Equation (9) will be found to be correct; equations (8) and (4) are not.

If we denote the permeability of the space *exterior* to the magnet by μ_e, instead of (4), we should have

$$(10) \qquad V = \Sigma\frac{m}{\mu_e r},$$

which accords with (3), and is true in any system of units.

In the electro-magnetic system the dimensions of μ are $M^0L^0T^0$; hence μ does not affect the dimensions in this system, and (6) and (7) are correct.

In the electro-static system the dimensions of μ are $L^{-2}T^2$; hence the dimensions of magnetic potential derived from (10) are :—

$$(11) \quad V = \frac{m}{\mu_e r} = \frac{M^{\frac{1}{2}}L^{\frac{1}{2}}}{L^{-2}T^2L} = M^{\frac{1}{2}}L^{\frac{1}{2}}T^{-2},$$

which agrees with (9), and is correct.

IN A UNIFORM MEDIUM THE MAGNETIC POTENTIAL DUE TO A CURRENT IS INDEPENDENT OF PERMEABILITY.

The introduction of μ in the expression for the magnetic potential due to a magnet (4) gives the same dimensions to magnetic potential (see 11), as derived from (5), the expression for the magnetic potential due to a current. That the permeability of the medium should be taken into consideration, as above, in the expression for the magnetic potential due to a magnet, is clear; but should we not expect the permeability to enter in a similar manner in the corresponding expression for the magnetic potential due to a current (see 5)? The equivalence of a current and a magnetic shell as stated by Ampere would lead to this conclusion. Such, however, is not the case; equation (5) holds true as it is written. The magnetic potential at a point due to a current is independent of the permeability, a fact the explanation of which merits attention.

In *air*, the magnetic potential at a point due to a current, may be obtained from the principle of the magnetic shell as follows. Consider the circuit replaced by a shell consisting of elementary magnets, with axes in the direction of the thickness of shell. If r and r' are distances of the point P from the two poles of one of these elementary magnets, of length l and pole strength dm, the magnetic potential at the point P, due to this magnet, is

$$(12) \qquad dV = \frac{dm}{r} - \frac{dm}{r'}.$$

Inasmuch as the length of the magnet is small compared with its distance from the point P, for r' we may write $r + l\cos a$, where a is the angle between the axis of the magnet and a line connecting it with the point P. Hence

$$(13) \qquad dV = dm\left(\frac{1}{r} - \frac{1}{r + l\cos a}\right) = \frac{ldm\cos a}{r^2},$$

the last term being obtained by approximation. But from the equivalence of a magnetic shell in air (see 1) we have

$$(14) \qquad ldm = IdA;$$

where dA represent the polar area of an elementary magnet. Making this substitution in (13), and remembering that $dA\cos a \div r^2 = d\Omega$, the solid angle at P subtended by the polar surface of the elementary magnet, we have

$$(15) \qquad dV = Id\Omega; \text{ and } V = I\Omega.$$

This reasoning holds true for air; but (12), (13), (14) are true only for air, or a medium whose permeability is unity.

For *media other than air* equation (15) still holds. If μ_e is the permeability of the space *exterior* to the space occupied by the magnetic shell to which the current is considered equivalent, instead of (12) and (13), we have [see equation (10)]:—

$$(16) \qquad dV = \frac{dm}{\mu_e r} - \frac{dm}{\mu_e r'} = \frac{1}{\mu_e}\frac{ldm\cos a}{r^2}.$$

If μ_i is the permeability of the *interior* space, or that occupied by the equivalent magnetic shell, instead of (14), we have

$$(17) \qquad ldm = \mu_i IdA.$$

Substituting (17) in (16), we have

$$(18) \qquad dV = \frac{\mu_i}{\mu_e}\frac{IdA\cos a}{r^2} = \frac{\mu_i}{\mu_e}Id\Omega.$$

$$(19) \qquad V = \frac{\mu_i}{\mu_e}I\Omega.$$

This is the expression for the magnetic potential at a point P, due to a current I, in a circuit subtending the angle Ω at the point P, when μ_i is the permeability of the space occupied by an hypothetical equivalent shell, and μ_e is the permeability of the surrounding medium.

In all cases usually considered $\mu_i = \mu_e$; that is, in any uniform medium, the magnetic potential due to a current is

$$(20) \qquad V = I\Omega,$$

and is independent of the permeability of the medium.

* R. Clausius, "Ueber die verschiedenen Maassysteme zur Messung electrischer und magnetischer Grossen," Verhandl. des naturlust. Vereins des Preuss. Rheinlande und Westfalen, Vol. XXXIX., 1882; also, Philosophical Magazine, June, 1882, p. 381.

† J. D. Everett, Philosophical Magazine, May, 1882, p. 376.

‡ Philosophical Magazine, 1882: J. J. Thomson, Vol. XIII., p. 427; J. Larmor, Vol. XIII., p. 429; J. D. Everett, Vol. XIII., p. 481; C. K. Weak, Vol. XIII., p. 530; R. Clausius, Vol. XIV., p. 124; J. J. Thomson, Vol. XIV., p. 225; O. J. Lodge, Vol. XIV., p. 357; E. B. Sargent, Vol. XIV., p. 395.

§ Von Helmholtz, Wiedemann's Annalen, 1882, No. 9, p. 42; also, Philosophical Magazine, Vol. XIV., p. 430.

The Albany Street Railway Convention.

The Street Railway Association of the State of New York is sending out a list of topics to the street railway companies of the State, and a letter urging them to send representatives to discuss one or more topics at the next meeting of the association, which will be held at Albany, on Tuesday, September 17.

All electrical supply houses are invited to send representatives to this meeting. Space will be furnished for the exhibition of samples of material, small models, etc. The place of exhibit will be a suite of hotel rooms, engaged for the purpose, so that large and heavy exhibits can not be shown.

A large attendance is expected at this meeting. Seven or eight of the smaller roads throughout the State have recently joined the association and applications for membership are being received daily. The papers will be interesting and instructive, 15 minutes being allowed for the delivery of each one.

Baltimore - Washington Electric Road.

Work was begun on August 28 on the Baltimore end of the Baltimore & Washington boulevard—Columbia & Maryland Electric Railway. This section of the line will extend from the city limits to Ellicott City, about 10 miles. Work was begun last week on the Washington end. It is the intention to equip and operate the Washington and Baltimore ends of the road when finished, while the work is in progress on the middle sections. A contract for 13,000 tons of steel rails has been awarded. The major part of these are to be 85-pound T rails.

Mr. Widener on the Underground Trolley.

Mr. P. A. B. Widener is reported in a newspaper interview as saying that next year the Widener-Elkins syndicate will probably equip all of its lines with the underground trolley system. "It is by all means the most reasonable and practical street railway system there is," Mr. Widener said, "and if it can be made to stand the weather at all times, we will use it on all of our lines. I don't know just how many miles of road we control. We have more than 200 miles in Philadelphia alone, and 125 miles in New York."

The Interstate Telephone and Telegraph Company is reported to have obtained franchises at the more important cities and towns in North Carolina, and has arranged to connect Raleigh, Goldsboro, Winston, Newbern, Charlotte, Greensboro, Oxford, Henderson and other places. Work, it is said, will begin in a few days.

PENNSYLVANIA STREET RAILWAY ASSOCIATION.

FOURTH ANNUAL MEETING HELD AT WILKESBARRE LAST WEEK—WHAT WAS DONE AND WHO WERE THERE.

The fourth annual meeting of the Pennsylvania Street Railway Association, which opened in the Armory Building at Wilkesbarre, September 4, showed an excellent representation of the electric railway interests of the State. Hon. F. M. Nichols, Mayor of the city of Wilkesbarre, opened the meeting, after a word of introduction by President John A. Riggs, with an address of welcome, in which he said:

I welcome you to this city, and I am certain that its hospitality will fill the measure of your most generous expectations. Like all other communities in which the electric street railway system has been established, we many times feel that its operators are too greedy in their encroachment upon the rights of the public. But after all, we are compelled to admit that the enterprise is one of the greatest blessings of the age. Surely the truth of this statement is not more clearly demonstrated in any section of the country than in this city. We are proud of the magnificent service the street railways furnish here and to their presence we are largely indebted for the glowing prosperity we are now enjoying.

He was responded to by ex-Mayor Jas. R. Kenney, of Harrisburg, who gave an extemporaneous address. He said that all he knew about street railways was that he took the car and paid his fare. He was unprepared to make a response and the only reason he knew of for doing it was that he did not know enough to decline.

The following active members were present: F. B. Musser and F. Bent, of the East Harrisburg Street Railway Company and Harrisburg Traction Company; A. Markle and G. W. Thompson, of Lehigh Traction Company; S. P. Light, of Lebanon & Annville Railway; J. F. Ostrom, of Middletown & Highlispire Street Railway; John G. Riggs, Jas. R. Kenney, A. B. Arrowsmith, Reading Traction Company; E. W. Ash, Schuylkill Traction Company; W. S. Duckett, City Passenger Railway, Altoona; B. F. Meyers, John Graham, A. W. Hollenback, W. J. Eno, J. C. Meixell, James Fagan, John Clifford, of Wilkesbarre & Wyoming Traction Company; Wm. H. Hayes, West Chester Street Railway; E. H Davis and J. W. Cochran, of Williamsport Street Railway; W. H. Lanius, York Street Railway; J. W. Bonnell, Carbon County Electric Railway. The associate members present were: W. H. Heulings, of the J. G. Brill Company, Philadelphia; R. E. Moore, of the Philadelphia General Electric Company; H. J. Crowley and A. K. Baylor, of the General Electric Company, New York; Wm. Fulling, of the Peckham Truck and Motor Company; J. F. Ostrom, of Pennsylvania Steel Works; Arthur H. Allen, of Westinghouse Electric and Manufacturing Company; E. M. French, Quaker City Rubber Company; W. T. Dixon and J. W. Perry, of the Philadelphia branch; H. W. Johns Manufacturing Company; Frank Mansfield, of Breese & Mansfield, Philadelphia; John Howard Yardly, of the Philadelphia Wheel Company; F. A. Lex, of A. Whitney & Sons, Philadelphia; F. W. Darlington, electrical engineer, Philadelphia; representative of the John A. Roebling's Sons Company, Trenton, N. J.; S. L. Nicholson, of James Boyd & Brothers, Philadelphia.

After ex-Mayor Kenney's remarks, the delegates listened to a paper read by Mr. A. K. Baylor, electrical engineer of the General Electric Company, on "Power Consumption of Electric Railways." Although Mr. Baylor discussed the subject in an impromptu manner from notes, he handled it in a most masterly way, reducing theory to a point of practice for application, dividing the subject into two parts and considering

B. F. MEYERS, PRESIDENT PENNSYLVANIA STREET RAILWAY ASSOCIATION.

S. P. LIGHT, SECRETARY PENNSYLVANIA STREET RAILWAY ASSOCIATION.

first, apparatus itself, efficiency, etc.; second, handling methods and practices in the operation of electric railways. The points advanced were: First, comparison of beltage and direct-coupled generation; second, the efficiency of generators and the most advantageous division of power into units; third, the consideration of the line, its insulation, the ground return and feeder system; fourth, consideration of the car, its equipment, efficiency of motors, rheostatic *versus* series and parallel control; fifth, use of the Watt system to establish standard low currents and units to guard against unobserved leakage; sixth, operation of cars, ignorance on the part of motormen in management of controllers and the advisability of training the men by practical demonstrations, illustrating the violent fluctuations of current due to poor handling; seventh, the proper maintenance of the equipment.

Much of Wednesday afternoon was taken by an open discussion on the "Laws of Street Railways," "The Prevention of Accidents and the Adjustment of Damages," "Belt Lines in Inland Cities" and "State and Municipal Taxation of Street Railways."

Succeeding this debate, business matters were brought before the house and the secretary's report showed a balance of $1,584.70 in the treasury.

The nomination of officers for the association for the ensuing year resulted in the election of B. F. Meyers, of the Wilkesbarre & Wyoming Railroad, for president; Jno. Lloyd, of the City Passenger Railroad of Altoona, vice-president; Robert E. Wright, of the Allentown & Bethlehem Railway, second vice-president; S. P. Light, Lebanon & Annville Street Railway, secretary; W. H. Lanius, York Street Railway, treasurer, and Altoona was decided upon as the next place of meeting.

The meeting was then adjourned and in the evening the visitors were most hospitably entertained by the Wilkesbarre & Wyoming Railroad Company at Hanover Park.

The following morning, Thursday, the time was spent in the way of an informal meeting and in looking at the exhibits, no papers being read.

In the afternoon the visitors were given a trolley ride by the Wilkesbarre & Wyoming Valley Traction Company, and at four o'clock a collation was served by the managers of the company at Hanover Park. Mr. James Graham, general manager of the company, gracefully carrying the honors of the host.

EXHIBITS AND VISITORS.

The Quaker City Rubber Company, of Philadelphia, had one of the most elaborate exhibits in the hall, in charge of Mr. E. M. French. A full line of their packing and belting was shown and Mr. French carried on a general campaign of education on the subject of "P. P. Diagonal Rod Packing," in the way of sidetalks and circulars.

The Peckham Truck and Motor Company, of New York, had on exhibition a model of their truck in charge of Mr. Fulling.

Messrs. T. D. Dixon and Jas. W. Perry, of Philadelphia, had in charge an exhibit of H. W. Johns Company's products, embracing trolley line insulators, moulded mica, weatherproof sockets and asbestos pipe and boiler covering.

Mr. A. F. Lex had an exhibit from A. Whitney & Sons' Car Wheel Works, of Philadelphia. It consisted of a pair of 33-inch car wheels fitted on an axle ready for service, also loose car wheels and brake shoes.

Mr. H. N. Ransom, representing the Consolidated Car Heating Company, of Albany, showed a number of that company's electric heating devices.

Mr. John C. Dolph, representing the Forest City Electric Works, Cleveland, showed a line of their roll drop commutator bars. These bars are cast from pure copper and rolled or drop forged to a size by special machinery.

Mr. G. S. Allison, of 31 Broadway, New York, had several of the St. Louis Car Register Company's fare registers on view.

Representatives of other companies present at the meeting were: S. L. Nicholson, manager railway supply department Jas. Boyd & Brother, Philadelphia; F. A. Keyes, of Philadelphia office Washburn & Moen Manufacturing Company; Chas. J. Mayer, of R. D. Nuttall Company, Alleghany; H. C. Dick, of Flood & Conklin, New York; F. D. Russell, Rochester Car Wheel Works; John S. Pugh, representing the John S. Stephenson Company, Limited, New York; J. Hannah, of McGuire Manufacturing Company, New York; Frank H. Stewart, of Frank H. Stewart & Company, supply house, Philadelphia; W. B. Durfee, Jr., of Composite Brake Shoe Company, Boston; F. S. Kenfield, *Street Railway Review*, Chicago; F. B. Vandergrift and W. K. Beard, the *Car* Publishing Company, Philadelphia and New York; Mr. Dickerson, of *Electric Railway Gazette*, and S. H. Goddard, of the ELECTRICAL REVIEW, the only electrical journal represented at the convention. F. A. McGee, representing E. S. Greeley & Company, New York; Walter E. Harrington, of Cutter Electric Motor Manufacturing Company, Philadelphia; A. C. Vosburgh, New Process Rawhide Company, Syracuse; Jay Wiley, of the Western Electric Company's railway supply department.

Has Noticed the Ancient Flavor of Our Contemporaries' "News."

A Chicago friend sends us the following, but does not give the name of the keen observer who penned it or the journal in which it appeared. An editor who can condense so much truth and point in so few lines is worthy of most honorable mention:

There seems to be some dispute about which is the oldest journal devoted to electrical news. The ELECTRICAL REVIEW, New York, has probably the best claim, from the fact that it was printed previous to its contemporaries. The news, however, in some of the other journals is older.

An Elevated Road Bankrupt.

The Alley Elevated Road, the first elevated road built in Chicago, and which ran to the World's Fair, is bankrupt. It has earned this year only half of its $360,000 fixed charges. Foreclosure proceedings will begin October 1. Efforts are now being made to form a reorganization scheme, and an assessment of $25 is proposed. The stock is selling at 10.

A New Incandescent Lamp.

Frank H. Stewart & Company, 35 North Seventh street, Philadelphia, are preparing to place a new incandescent lamp on the market. The company are expecting to have the first lot from the factory in a few weeks and they are confident that it will be found worthy of a large sale.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, SEPT. 11, 1895.

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CORNELIUS HERZ.

"The Ineradicable Blower," a rather far fetched appellation, is applied by our esteemed French contemporary *L'Industrie Electrique* to the once famous Knight of the Legion of Honor, Dr. Cornelius Herz. Not satisfied with such measure of encomium, our worthy confrère opens his broadside as follows:

The dying gladiator of Bournemouth, whose standing in the courts of France we will not discuss, has succeeded in making himself spoken of. The *Pall Mall Gazette* of August 1 has wrenched from him an interview, a master-piece of boasting, advertising and lying which, on that account, is worth while being brought to the attention of our readers. He has accomplished a great invention in submarine telegraphy, etc.

Here follows a verbatim translation of the *Pall Mall Gazette* article, which winds up as follows:

Q. "Do you authorize the publication of a hint concerning the principle underlying your system?"

A. "As I told you, I cannot consent to this because my invention has not been patented yet. After my death you will see it in operation and say: 'It is exactly as I have been told by Dr. Herz.' I have described my invention to no one, and have alluded to it only to one or two of my intimate friends. Of course, in telling you what I shall accomplish, I must request you to admit hypothetically that I speak the truth. Remember that it is I who say so, and my name is far from being unknown in electrical science. Remember also that my telephone has been adopted by the French government, and is at present employed in the international service between France and Belgium. No scientist excepting Pasteur, and no Jew like myself, has been admitted to the highest grades of the Legion of Honor. As a scientist, I was chosen to represent the United States at the great International Congress of Electricians in 1881."

L'Industrie Electrique, commenting on the above paragraph, says: "Such impudence and complete ignorance disarms us; we must abstain from an analysis of this menu of lies, contradictions and absurdities."

With the permission of our esteemed contemporary we would suggest that such acrimony on the part of former admirers of Dr. Herz is, to say the least, harsh. It should be remembered that as the editor of *La Lumiere Electrique* Dr. Herz is entitled to a little courtesy, even from his political enemies. Whatever his political failings may be, it is but common justice to recognize that, as editor of *La Lumiere Electrique*, he has had a wholesome influence upon the development of the various electrical industries of France.

We haven't heard lately anything about that new world-revolutionizing motor that several distinguished New York capitalists have locked in a cellar uptown with the inventor chained thereto. Messieurs, this suspense is telling on all of us.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The stock market this week has been quite interesting and active and has furnished successive surprises on account of strongly contrasting movements in prices. The distribution of business has been much better than the recent average. The market opened after the holiday interruption strong and active under buying for both accounts, professional manipulation not being wanting. The international stocks were favorably influenced by higher quotations for Americans in London and by buying for that account in this market. The considerations affecting values included the engagements of $4,750,000 in gold for export, unimpaired strength of the exchange market, revived rumors of an anthracite coal settlement, advances in sugars, crop reports almost uniformly favorable, rumors of a Pacific Mail-Panama Railroad compromise, the publication of the annual report of the Chicago, Milwaukee & St. Paul company and the declaration of the regular dividends by the American Sugar Refineries Company. The greater part of the week London was a seller, but on the favorable crop reports and the successive deposits of gold by the so-called government bond syndicate to repair the inroads made by exporters on the treasury reserve appeared to modify its position somewhat. The industrial shares were fully up to the record in point of eccentric movement and the market generally closed dull but firm.

The week in the electrical stocks has shown moderate activity and uniform strength in prices, some of the gains being notable. General Electric loomed up into a commanding position in point of activity late in the week and bettered a steadily advancing record of prices. The stock closed in good demand at 40, showing a gain, as compared with the previous week, of 2¼ per cent. What little news regarding the stock that was obtainable was, as a rule, bullish.

Another strong feature was Edison Electric Illuminating of Brooklyn, which advanced to 109½, a gain for the week of 3½ per cent. The first mortgage 5 per cent bonds of the New York company were moderately dealt in at unchanged prices, while the consolidated 5's, after a fall of 3½ per cent late in the week, closed at 103, a net decline of ½ per cent as compared with the previous week's closing. The stock of the company was dull but strong, closing at a gain of 1⅜ per cent.

Erie Telegraph and Telephone was the most conspicuous of the entire group recording successive advances and closed at 62, a gain of 9¼ points for the week. The rise was not attended by any special news.

American Telegraph and Cable was inactive with nominal quotation 96.

Western Union was the weak feature. A declining tendency became manifest at the outset and the stock under sales attributed to actual

owners yielded from 95⅜, the highest on Tuesday, to 93⅞, recovering to 94⅛. The volume of business, however, was only moderate. Director John T. Terry says that the rally in general business all over the country has considerably increased the business of the company as gauged by the increases in earnings recorded at the test offices.

The general tendency of all of the important telephone and electrical stocks during the past month has been toward higher figures, as evidenced by the sharp advances in the bid prices. In Bell Telephone of Missouri the difference in the bid and asked is 10 points, in Chicago Bell 15 points, and in Fall River Electric 10 points.

The regular monthly table giving the quotations of important telephone and electrical stocks, showing changes which occurred during the month of August, follows:

Telephone:	August 1. Bid.	August 1. Asked.	Sept. 1. Bid.	Sept. 1. Asked.
Bell	197½	206	199	200
Bell of Mo.	175	185	175	185
Central Union	51½	....	55	56
Chicago	166	175	165	180
Erie	57½	58	52¾	....
Hudson River	38	42	37	39½
Missouri & Kansas	40	50	....	....
New England	88	....	88	89
New York & New Jersey	118	130	117	119
Providence	92	95	93	95½
Southern New England	95	97	96	98

Electric:	August 1. Bid.	August 1. Asked.	Sept. 1. Bid.	Sept. 1. Asked.
Boston Illuminating	116	....	112	116
Bridgeport Electric	32	34	32½	35
Edison Ill. Boston	137½	....	152½	155
Edison Ill. Brooklyn	97	99½	107	....
Edison Ill. Philadelphia	....	115	113	115
El. Lt. & P. (Sun. Tran.)	93¾	93¾	87	90
Electric Storage	36¾	37	46	47
Fall River Electric	100	100	100	110
General Electric	36	36⅜	37⅜	37⅞
General Electric, Pfd.	69¾	70	69	71
Lowell Electric	94	96	94½	96
Missouri Electric	....	100	....	100
Narragansett Electric	84¾	85¼	84½	85½
Salem Electric	101	102½	101	103
United States Elec. Lt.	133¾	134½	....	....
Woonsocket Electric	....	115	....	....

It is said that the Baldwin Locomotive Works and Westinghouse people are preparing designs for manufacturing electric locomotives, one providing for a trolley locomotive to be operated on the same principle as a trolley car, another for a locomotive to take up the current from a third track, intended for use on elevated railroads, and the third for locomotives to be operated for street car traffic by the electro-magnetic traction system.

The Commercial Cable Company has declared the regular quarterly dividend of 1¾ per cent, payable October 1. Transfer books close September 20 and reopen October 2.

The Electric Illuminating and Power Company, of Long Island City, has increased its capital stock $100,000 to $150,000.

Electric storage battery stocks, common and preferred, scored their highest prices on the Philadelphia Stock Exchange on Wednesday, touching 48 and 47½, respectively. Room traders, who were buyers at considerably lower figures, realized profits to some extent, but all stock offered met with ready buyers.

On the Boston Exchange, Bell Telephone was steady at 198 @ 198½; Erie Telephone was bid 54 and offered at 54½; New England Telephone firm, offered at 89; Fort Wayne Electric 1¾ bid, offered at 1¾; Westinghouse common 36½ bid, 37 asked; the preferred firm at 55 bid @ 56 asked.

In the following table is given the range of prices and par value of sales of the bonds of important electrical stocks dealt in on the New York Stock Exchange during the month of August:

	Sales.	High.	Low.
Ed. El. Ill. of N. Y. 1st 5's	197,000	110	109½
" " " con. 5's	77,000	108½	103
" " B'klyn 1st 5's	39,000	112¼	110
General Electric deb. 5's	67,000	89½	90
Western Union col. tr. 5's	27,000	110	111

BAIN.

New York, September 7, 1895.

The Demand for Electric Locomotives.

In writing of the Westinghouse-Baldwin alliance, "Holland," in the Philadelphia *Press*, says:

Mr. Johnson, one of the representatives of the Baldwin company, was in the city to-day, and while he preserved a business discretion in speaking of the identity of the propositions which have been received, yet he did say so much as this: That to the surprise of these veteran builders they had found already that instead of there being a slow development of demand for electric locomotives it was instead instantaneous, very great, and had come from capitalists whose investments are in all parts of this country. To use his own expression: "We found to our surprise that the harvest was ripe; that investors are ready everywhere for the electric locomotive, and that the indications are sufficient that within a very short time a great number of railways will be equipped with electric plants and locomotives." Of course, Mr. Johnson could not be expected to indicate the nature or the location of these propositions, for they are still mere propositions. They are requests to the combination to furnish estimates and other data, by which the owners of various railroads can form some judgment about the desirability or economy to be obtained by the use of electric systems. But he does say that the extent of the demand indicates that this subject is uppermost in the minds of nearly all those who control railways in this country. Therefore, it is fair to infer that if the propositions are answered in such manner as to encourage these capitalists, and to convince them of the advantage of electricity, we are going to see in the next 18 months or two years the swiftest revolution in the use of motive power for the propulsion of passenger and freight trains that this country has ever known. In fact, the change from the stage to the steam railway cannot be compared with that which is likely to take place in a very short time.

Those who are directing the combination found it necessary immediately to prepare plans for what would be regarded as standard electric locomotives. That work is now in progress. Probably not until it is completed, and the locomotives are ready for inspection and experiment, can there be satisfactory answers to most of the propositions which have been made. But the building of these new electric locomotives has now progressed so far as to make it seem certain that these machines themselves will be the sufficient answer. It has been decided to construct two locomotives which are to be the standards. One of them will be available for heavy service, such as switching freight trains or for drawing passenger cars for short distances. The other will be adapted particularly to elevated and suburban service. The latter locomotives will be smaller, designed to draw lighter trains and especially suitable for use upon such an elevated system as that of this city. They are also designed for service such as that of the New Haven road upon its New Rochelle branch, or upon some of the Long Island suburban roads.

A Rosy View of General Electric.

It can be authoritatively stated that an announcement will be ready within the next few days showing developments favorable to General Electric stock beyond anything that even the most sanguine friends of the property have been anticipating.

During the month of August net earnings were such as to warrant the prediction of an early return to dividends.

It is stated by one of the foremost officials of the company that there are now pending plans for taking contracts for the putting of electrical equipment upon no less than 14 of the most important railroads in the country. Some of these railroads will equip branch lines, and at least two of them will carry out plans which are much more far-reaching than any that have yet been made public. During the coming 12 months officers of the General Electric expect that their company will do four times the business done in any past 12 months.—*Journal of Finance, New York.*

A New Brooklyn Illuminating Company.

The Brooklyn Union Gas Company, of Brooklyn, N. Y., was incorporated on September 9 to supply gas and electricity for public and private uses. The capital stock is $15,000,000 and the directors are: George W. Young, Grant B. Schley, John T. Mills, Jr. and Hamilton H. Durand, of New York city; Charles E. Ball and George R. Turnbull, of Brooklyn; and Watson B. Dickerman, of Mamaroneck.

Our highly esteemed contemporary, the *American Machinist*, is somewhat excited over the question of brakes on trolley cars, and asks: "Among the legion of journals whose name is electrical, where is the one that dares to tell the truth, the whole truth and nothing but the truth about the brake on the trolley car?" Will our contemporary pause in its agitation and tell us what the brake is guilty of? As Marshall P. Wilder would say, "What's the answer?"

The Capital Telephone and Telegraph Company have already put in place 300 telephones at Sacramento, Cal..

THE MONTREAL STREET RAILWAY CONVENTION.

ARRANGEMENTS MADE FOR A SPECIAL TRAIN TO LEAVE NEW YORK OCTOBER 14—LARGE ATTENDANCE EXPECTED.

The annual convention of the American Street Railway Association opens at Montreal, October 15, and continues four days. From the large number of rooms engaged at the Windsor Hotel—convention headquarters—and the number of applications for space in the exhibition hall, it is likely that this convention will be the largest in the history of the association. President Joel Hurt, of Atlanta, Ga., has been most earnest in looking after the interests of the association, much of the detail falling on his capable shoulders upon the death of Secretary Richardson. Later the Executive Committee asked Col. John N. Partridge, of Brooklyn, one of its members, to act as secretary *pro tem.*, and the work of this important office will, therefore, be carefully and intelligently looked after.

Arrangements for a special train from New York city have been made as follows under the direction of a committee of the association:

Arrangements have been made for a special train *via* New York Central & Hudson River Railroad Company for the accommodation of delegates and others attending the Montreal Convention of the American Street Railway Association. The convention opens Tuesday, October 15, at 10 A. M. The special train will leave the Grand Central station, Forty-second street, New York, Monday, October 14, at 6 P. M., arriving in Montreal Tuesday morning, October 15, in time for breakfast. A dining car will be attached to the train leaving New York.

Passengers from all points West can connect with the special at Utica, N. Y., Monday night by leaving the following cities at the hours mentioned:

St Louis, 7.55 P. M., October 13; Cincinnati, 8.25 P. M., October 13, *via* "Big Four."

Toledo, 9 A. M., October 14; Cleveland, 12.50 P. M., October 14, *via* Lake Shore.

Detroit, 9.40 A. M., October 14, *via* Michigan Central.

Buffalo, 6.50 P. M., October 14; Rochester, 8.43 P. M., October 14; Syracuse, 10.20 P. M., October 14, *via* New York Central.

Arrangements are being made for a daylight return trip through the beautiful Adirondack scenery, including a stop at Lake Saranac.

The special rate of a fare and a third for the round trip has been granted, making the cost of a ticket from New York city to Montreal and return $13.35. Tickets should be bought from all points on the certificate plan, the purchaser taking a delegate's certificate from the ticket agent, which, when properly countersigned at Montreal, will entitle the holder to a return trip at one-third the regular fare. Wagner sleeping car accommodations will be provided at the usual rate of $2 per berth from New York city to Montreal.

The committee in charge would respectfully urge all who intend to take this special train to reply at once, in order that ample accommodations may be provided and proper assignments made.

Inquiries relating to the reservation of berths, tickets, etc., should be addressed to M. C. Roach, General Eastern Passenger Agent, 413 Broadway, New York, or any member of the committee.

JOHN N. PARTRIDGE, Chairman, Secretary American Street Railway Association, Brooklyn, N. Y.
JAS. H. MCGRAW, Havemeyer Building, New York.
CHARLES W. PRICE, 13 Park Row, New York.
Committee.

A telephone war is raging in Kansas between the Missouri & Kansas Telephone Company and the Harrison International Telephone Company. The battlefields are principally Topeka, Leavenworth, Wichita and Salina. The war has even run over into St. Joseph and Carthage, in Missouri. In Wichita the Missouri & Kansas company has just offered telephone service at $30 for residence and $36 for business houses for a year. In Salina telephone service is said to be given away.

It is well to keep an eye on the coming horseless carriage. Electricity may or may not be the coming power here. Just now the gas engine is looked upon with most favor.

ELECTRIC RAILWAY NOTES.

The electric railway between Buffalo, N. Y., and Kensington, halfway to Tonawanda, is in successful operation.

The Bridgeport Traction Company has made great improvements in its terminal depot and car barns at East Bridgeport, Conn.

President John Kilgour, of the Cincinnati Consolidated, says that five cents straight is the lowest fare his company can afford to give.

The deal to consolidate the street railway plants at Elgin and Aurora, Ill., and build a line connecting the two cities has been declared off.

The Pawtuxet Valley, R. I., Electric Street Railway Company is having plans made with a view of extending the line from Riverpoint to Natick, a distance of 10 miles.

The Bridgeport, Conn., Traction Company for the third week in August earned $7,538. This is an increase over last year's business for the same week of $4,822.

Now that the Consolidated system has passed into the hands of the Syracuse Street Railroad Company, the latter concern has practically a monopoly of Syracuse, N. Y., city passenger traffic.

The Long Island Electric Railroad Company has withdrawn its application for a franchise to run its tracks through Far Rockaway and will establish its terminus at Inwood, near Far Rockaway.

The Metropolitan Elevated and the Alley L roads of Chicago are reported to be carrying 43,000 and 32,000 passengers daily, respectively. It is stated that neither road is earning its fixed charges.

The wives and sisters of the Free Masons worked as street car conductors at Bay City, Mich., recently, to raise money for the Masonic Temple fund. No accidents or unpleasant occurrences were reported.

The success of the underground trolley on the Lenox avenue line has decided the directors of the Metropolitan Traction Company, of New York city, to equip its Twenty-third street line with the same system.

It is stated that the earnings of the West End Street Railway Company, of Boston, increased in August at the rate of $4,000 per day over the corresponding month last year. August, 1894, showed an increase of about $1,000 per day over 1893.

The Siemens & Halske Electric Company of America has filed suit against Metropolitan Elevated, of Chicago, alleging that the latter's use of third rail is infringing a Siemens' patent. The case will be defended by the General Electric Company, the real party in interest.

Once on a time, says the New York *Sun*, a casual horse car met trains at Port Richmond, Staten Island, and the conductor cried: "This way for the brewery and Prohibition Park!" Now there is a trolley line to the park, and you can walk from there to the brewery. The trolley cars are well patronized; so is the walk.

The trailer freight car that brought the first consignment of Hale's luscious peaches from Glastonbury yesterday marks a new era in the development and adaptation of the electric surface railway for the economic transportation of produce from the rural districts to the city as a distributing center.—*Hartford, Conn., Telegram.*

Three companies are fighting for trolley franchises in the town of Pelham, N. Y., the Union Electric (Huckleberry), the New York, Westchester & Connecticut Traction Company and the North Mount Vernon Railway Company. The Union company has a franchise which it does not use, and the other companies are trying to have it taken away for their benefit.

The Brooklyn Heights Railroad Company, with the co-operation of the city authorities, has made arrangements to illuminate the fountain on the Prospect Park plaza, Brooklyn, N. Y., with various colored electric lights. The company not only furnishes the power, but has supplied all the necessary plant. Altogether 220 lights have been placed around the fountain, and the display is likely to draw crowds of visitors to the plaza.

The Third Avenue Railroad Company, of New York city, contemplates the use of electricity as a motive power for its lines. To this end the Third avenue company has constructed an experimental line to test thoroughly a new underground system. This line runs from the end of Amsterdam avenue line at 185th street to 195th street. A power house will be built at once, and the line will be operated by electricity all Winter. If the system is found to work well it will be applied to the rest of the Amsterdam avenue line down to East 125th street.

The Baltimore & Ohio Railroad, like the Pennsylvania and the Reading, has at last been obliged to recognize the tremendous inroads made upon its suburban passenger traffic by the trolley roads, and has taken steps to offset, as much as possible, this keen competition by a reduction in passenger rates. This reduction will affect not only the suburban passenger rates out of Philadelphia, but those out of Baltimore, Washington and Pittsburgh as well. The reduction will apply only to the 50-trip family tickets issued by the company, and is equivalent to about 25 per cent on the present rates for those tickets.

The Union Traction Company, the corporation which is to absorb the Philadelphia, People's and Electric Traction companies, will be chartered with a capital of only $100,000, which will immediately be increased to $30,000,000, the amount necessary to conduct the business of the company. The attorneys for the company made application over a month ago for the charter at a capital of $30,000,000, but Attorney-General McCormick was of the opinion that the charter should be granted with a lower capital and afterward increased, as the law states that corporations "may increase their capital to $30,000,000."

The Niagara Falls & Lewiston Railroad, better known as the Gorge road, was opened to the public on August 25. The first car left Lewiston well filled with passengers at 8 o'clock, and made the run through to the Buttery elevator and back in 40 minutes. Everything worked to a charm. The roadbed the entire length is in perfect condition, the power all that could be asked, and the cars, which are heavy ones, moved without the slightest jar or friction. The company has seven motor cars and five trailers now ready for use. Four of the motor cars were in use during the day, making trips every 20 minutes and carrying between 1,200 and 1,500 passengers at 75 cents each.

John D. Crimmins, president of the Metropolitan Traction Company, has authorized the statement that the company expected to have all of its lines in New York city in operation by electricity within five years. Ultimately it is the intention to obtain the power from the great station to be established on the Harlem River. This point has been selected because of the ease and cheapness with which coal can be brought there. For the present, however, a temporary plant will be constructed at the power house in East Twenty-fifth street, and the Belt and Ninth avenue lines will be operated by independent plants to be established for the purpose.

The suit brought against L. W. Serrell, electric street railway contractor, at Passaic, N. J., by George C. Spenser for $150, noted in the ELECTRICAL REVIEW, August 28, has been withdrawn. Spenser now swears to an affidavit stating that he asked Serrell to pay to him the amount of expense he had incurred in figuring on the work, provided he would withdraw his bid for the railway construction and that Serrell refused to do this and he then brought suit, which he has since withdrawn. Serrell states the judgment noted in the Passaic press was taken by default, his train being late, and decision rendered by the justice of the peace before he arrived and without any review of the case.

It is evident that the interests of the Calumet Electric Street Railway Company, of Chicago, are to be pushed by Mr. Farson, general manager, and his associates, says the *Economist*. Mr. Farson has leased the Englewood & Chicago road and is running cars to a direct connection with the Alley elevated at Sixty-third street. The Englewood & Chicago now runs from Sixty-third street to Brookline, and also connects with the Oakwoods Cemetery. The Calumet Electric Street Railway Company, which was the first to give trolley parties, now so popular, has introduced another innovation. This was a funeral train of its cars, which were appropriately draped. The procession went from West Pullman to Oakwoods Cemetery.

Sound Sense on Low Street Car Fares.

President John Kilgour, who is at the head of all the street railway lines in Cincinnati, recently made the following sound remarks against three-cent car fares:

Some people are always trying to get something for nothing, and when they get it, it is worth what they paid—nothing. We are to-day practically carrying lots of people free. Take the report of this company for August 18. There were 127,000 rides taken at five cents each. Of these 35,000 persons took transfers. Of the transfers 31,000 were used, so 31,000 people took rides on transfers which are really given for nothing. Sunday, however, is a big day for street railroad business, bigger than any other day of the week. Now, besides this giving of transfers, we yearly give away to institutions 100,000 free rides. In July we averaged 20,000 transfers a day, or $1,000 if people paid as they once did, for each ride. It can easily be seen that we cannot afford to give three-cent rides when we give the transfers.

Conduit System vs. Trolley.

On the whole, New York has gained by her slowness to take up with electricity. Her refusal to let the trolley in is about to end in the introduction of the underground system. This has been perfected, and the Westinghouse people now have a system in which the current is completed only under the body of the car. The General Electric Company is about to substitute an underground conduit system for the cable and horse cars of the whole city. If Philadelphia had kept the trolley out there would have been an underground system here. The trolley will soon be as antiquated as horse cars were, and Philadelphia has bound herself down with an overhead network of unsightly trolley wires.—*Philadelphia Inquirer.*

American Institute of Electrical Engineers.

The 99th meeting of the Institute will be held on Wednesday, September 25, the date having been changed from September 18 by the committee. A paper will be presented by Mr. Charles S. Bradley on "Phasing Transformers." Further details will be given later. Meeting of council will also be held September 25. The June and July issue of the transactions containing the first half of the proceedings of the Niagara Falls meeting is now going through the press and will be distributed shortly.

Enterprise of the Commercial Cable Company.

The Commercial Cable Company's steamer "Mackay-Bennett" has laid a submarine cable to the scene of the International yacht races. The end of the cable is on board and specially connected with England and France through the company's main ocean cable, landing at Coney Island. The Postal Telegraph Company also has an office on board and will forward telegrams to all points in the United States and Canada. Cablegrams and telegrams will be received on board at the regular tariffs.

ELECTRIC LIGHT FLASHES.

Twenty arc lights now illuminate the drive around Druid Lake, Baltimore.

The Rochester, N. Y., Gas and Electric Company is improving its pole lines.

The electric light plant in the Wayne Hotel, Peru, Ind., was recently destroyed by fire.

The Edison Company at Altoona, Pa., expects to inaugurate an electric heating service this Winter.

Batavia, N. Y., claims to supply itself with arc lights at 16 cents a night each from a municipal plant.

The people of Evanston, Ill., have started a vigorous movement against the overhead wires of the electric light and telephone companies.

The Edison lighting company at Paterson, N. J., will have a chimney 230 feet high on its new light and power station. The buildings have a frontage of 372 feet.

Two gangs of workmen employed by rival electric light companies are now at work putting up poles and wires for lighting the State fair grounds at Springfield, Ill.

The Fort Wayne Electric Corporation has secured the contract for furnishing the electrical equipment of the new city lighting plant at Flushing, Mich., at its bid of $4,000.

The Wilmington, Del., Light, Heat and Power Company will hold a meeting on September 13, after which it is expected that the company will get ready to go into the lighting business.

An election will be held on September 24 to decide whether or not Henderson, Ky., will have electric lights. It is expected that the vote will be four to one in favor of the lights.

The Columbus, Ohio, Illuminating Company wants the city to grant it a franchise to light the streets and alleys in certain quarters. The city refused and the company went to the Probate Court to secure the franchise.

George Marsh has commenced suit against the Utica Electric Light Company to recover $30,000 damages. Marsh had both arms so badly burned by falling on a dynamo at the company's works, where he was employed, that they had to be amputated.

The city of Tacoma, Wash., has recently received a number of applications for electric lights at the new rates. Manager Hurley, of the Tacoma Gas and Electric Light Company, has reduced that company's rates to meet the cut made by the city.

The new dam on Tomahawk River, together with the new electric light plant being put in by W. H. Bradley at Tomahawk, Wis., was recently entirely washed out. The building is completely demolished and has gone down the river. The loss is several thousand dollars.

The McKeesport, Pa., Electric Light Company has filed statements in suits against five insurance companies. The suits are to recover insurance on the plant of the McKeesport Light Company, which was destroyed by fire on March 31, 1893.

The stockholders of the Greenport L. I., Electric Light and Power Company have decided to sell the entire plant, giving Greenport people a refusal for a few days. Unless the property is sold by September 15 the plant will be shut down and Greenport will then be without electric light.

The McKeesport, Pa., Light Company has offered a very liberal donation to the general committee of the Junior Order United American Mechanics' state session. It proposes to illuminate the big arch in front of the headquarters on Fifth avenue. The offer has been accepted with gratitude.

City Electrician Dow says that Detroit's shade trees are kept in very bad shape and that they interfere with the proper illumination of the streets. He wants a tree ordinance enacted. Mr. Dow expects to have the entire city lighted by means of municipal plant by September 30. At present the city has 900 lights and the old company maintains 600.

J. S. Hays, formerly chief electrical engineer for Andrew Carnegie, and Robert Peebles, of New Castle, Pa., has consummated a deal by which they become owners of the stock of Hon. J. R. Finley, of Monongahela City, Pa., in the New Castle Electric Power and Arc Light Company, the incandescent plant, and New Castle Artificial Gas Company. The transfer dates back to August 1.

Two electric light companies at Little Rock, Ark., the Little Rock and the Little Rock Edison Electric Light and Power Company have been consolidated under the name of the latter company and the following officers elected: President, Dr. C. M. Taylor; secretary, S. R. Allen; treasurer, Oscar Davis. Mr. J. A. Van Etten will be the manager of the consolidated companies.

Electricity in Detroit.

The telephone made its first appearance in Detroit, Mich., in 1877. In 1880 the first electric lighting company was organized, which, in 1881, had between three and four miles of wire and 24 arc lights in service. In 1885 an electric railway, three and five-eighths miles long, was built. The city directory for 1894 shows 63 different classifications of trade connected with electrical work.

The Hoerde Electric Conduit System.

The illustrations on this page show an electric conduit system which is now being introduced into England by Messrs. Alexander Penny & Company, railway engineers, 107 Fenchurch street, London, having been originally worked out by the Hoerde Mining and Smelting Company, Westphalia. The illustrations are from London *Engineering*. The

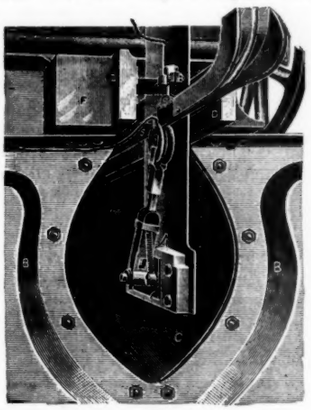
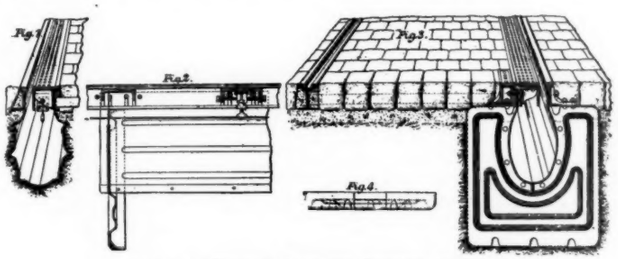


FIG. 5.—SHOWING METHOD OF INSULATION, HOERDE ELECTRIC CONDUIT SYSTEM.

conduit, as shown in Fig. 1, is arranged under one of the rails of the line, the rail in question being supported at intervals of five feet or so by yokes stamped out of sheet metal and corrugated for stiffness, as shown in Fig. 4. Between these yokes the conduit is lined with metal plates five-thirty-seconds of an inch thick, corrugated as indicated in Figs. 2 and 3. These plates are secured by bolts to the rail and guard at the top of the trench, and are flanged so as to be bolted together at the bottom. The guard, as shown in Fig. 1, is



FIGS. 1-4.—HOERDE ELECTRIC CONDUIT SYSTEM.

built up of angle irons secured to castings bolted to the yokes, just as the rail is, a groove of suitable width being left between the rail and the guard in order to accommodate the collector bar. The cable is suspended underneath this guard from insulators, as shown in Figs. 2 and 3. The current collector is of the underrunning trolley type, which has proved so successful in the various overhead lines which have been erected here and abroad. Insulation is secured by the use of vulcanized fibre. The particular arrangement adopted is shown in Fig. 5. The conducting wire, as will be seen, is fixed well above the bottom of the conduit, and is there unlikely to be flooded, even in severe storms, it being easy to keep the conduit comparatively free of water by suitable connections to the sewers. Being at the same time well under the guard, the conductor is well protected from mechanical injury. In going round curves, both rail and guard are accurately bent, but it is unnecessary to bend the lining plates, which are accordingly laid as tangents to the curve, cast-iron wedge-shaped filling-in pieces being used to give them a proper bearing on the yokes, which must, of course, stand radial to the curve. The work of laying the Hoerde conduit is claimed to be as simple as the putting down of a water main; and as all parts are made to standard dies, the work can be cheaply executed. The cost of the Hoerde system, with side conduit, as shown in Fig. 1, is said to be from 2£ 5*s*. to 2£ 10*s*. per yard, whilst with a central conduit between the rails it is 3£ to 3£ 5*s*. per yard.

International Electric Company.

The announcement is made of the location in St. Louis of another factory for the manufacture of incandescent lamps. The style of the new company, as incorporated under the laws of the State of Missouri, is the International Electric Company. The location of their factory is Nineteenth and Olive streets, St. Louis, being within three blocks of that city's new Union Station. Their factory building is modern in every respect, being five stories high and especially adapted to the work for which it is to be used. The manufacture of the lamps is in the hands of Mr. J. M. Davey, who for some 10 years has been identified with the incandescent lamp business. The new lamp, which will soon be put upon the market, will be known as the Davey High Grade. The object of the new company is to furnish a strictly high-grade lamp that will appeal for approval alike with the central stations, isolated plants and trade in general. The business management is in the hands of Mr. H. G. Ferguson, who has been actively identified with several large central stations in the West.

LITERARY.

Mr. Lloyd Osbourne, Robert Louis Stevenson's stepson and collaborator, has written an account for the October number of *Scribner's Magazine* of the daily life of the novelist and his family. Mr. Osbourne was a figure in Mr. Stevenson's household, whose importance was known to all well acquainted with the family. From the time when Treasure Island was dedicated to him in his boyhood he was constantly with his stepfather, to whom in all his projects he was a most trusted and valued assistant. He worked with him in laying out and building the beautiful place in Samoa, which has grown famous under the name of "Vailima."

The Central Loan and Trust Company of New York has brought suit against the Kansas City & Independence, Mo., Rapid Transit Railway to foreclose a mortgage of $800,000.

MENTAL MEMORANDA MATERIALIZED FOR THE MANAGER.

ITEMS OF INTEREST AND SUGGESTIONS FOR STREET RAILWAY MEN.

BY FORÉE BAIN.

There is always somebody ready and "waiting to see the manager" to give him pointers in regard to just how to manage or operate some particular portion of his plant, or to advise him to take out his old boilers and substitute "ours," or that unless he exchanged his old type dynamos for "our" new direct-driven dynamos he would land high and dry on the shoals of disaster. He has this kind of advice pumped into his unwilling ears day after day, until he really considers this experience a part of that which necessarily makes up the life of the average manager. He patiently listens to the anxious reformers and then acts upon his own judgment, for who can better consider all of the environments and conditions than he? His anxious adviser has only one object in view, to sell his goods, but the manager must consider the question of paying for his improvements, his near-at-hand dividends that are so anxiously looked for and expected by the stockholders; and a number of matters may aggregate into a very material reason for his refusal to immediately convert his plant into one of the "up-to-date" characters. These reasons he is not always pleased to enumerate to the persistent salesman, who leaves him with the impression that he is by no means the aggressive, energetic business man he had supposed him to be.

I have always found the manager to be a very willing and earnest listener to suggestions when such suggestions come from some one who hasn't "an axe to grind." He is ready to exchange opinions and to carefully consider the experience or opinions of others.

What I have to say is more in the nature of suggestions than advice and is intended more to call the attention to the subjects I have in mind so that each manager may consider them and arrive at his own conclusion.

When horses were used as a motive power for street cars it was the universal custom to stop the car on the *far* crossing of the street intersection. The obvious reason for the practice was to avoid blocking the crossed street to any extent by the horse in the event of the car being stopped on the *near* crossing. When cable and electric cars went into use this custom of stopping on the far crossing was continued, simply because it had been the practice or probably because it was not desirable to change the custom as long as there were still a few horse cars left running on the same tracks or even in the same city. Now that horse cars have about passed into history, why should this custom be continued?

I maintain that street cars should be stopped on the *near* crossing of the street intersection. Why?

1. Because the motorman can make more exact stops, having the street corner or crossing as a guide.

2. When he crosses the street he has his train or car under control.

3. He does not have to cross the street under full speed and can better look out for vehicles or pedestrians from the cross street.

4. For the foregoing reasons the motorman can make better time, and

5. The passengers are not so liable to jump on and off while the car is in motion, and should they do so the car is not running at full speed when passing the cross street as they are now.

Here's another suggestion for managers having long lines:

Telephones are cheap now; you can buy a complete set for $10 or $12. Why not run a telephone line on your poles to the terminus of your line and to several intermediate points, so that a car conductor out on the line can communicate with the power house in case of accident or trouble?

A battery of accumulators properly connected in circuit and located out on your line some distance from the power house would prove to be of more value than you can be made to believe, until you have tried them. These would prove to be of especial value if they are located near a heavy grade on the road. They will save copper in line; they will save time; they will reduce the burned-out armature from climbing the hill; they will cause a more even or equal load on the engines and dynamos and prevent shocks to such machinery by such largely varying load; they will act as an elastic cushion in this way and they may be used to run the "owl" car after the dynamos and engines have been shut down at night.

There are a great many nickels taken on electric cars these warm Summer nights from passengers who are riding for the pleasure they derive, and there are 10 times the number of nickels remain in the pockets of the would-be passengers, for the reason that the pleasure of the ride, or the sensation of moving rapidly through the air on a hot Summer night is offset by the uncomfortable, hard wooden seats that they are forced to occupy.

The seats are made of hard wood, straight back, and in every way designed to forcibly remind the occupant of the reality of life; and unless he has spikes in his shoes he is liable to slip out and on to the floor, and he may be considered fortunate if he doesn't get under the wheels.

A woolen upholstered seat is too warm or too hot for Summer use, and these slick, loaf-shaped cane seats are an abomination. A passenger slips around on them in such a fashion that he doesn't know where he will bring up, and even though they may be somewhat yielding, they are harrassing in shape.

Why not use a cool fabric of some kind and have the seats and backs inflated with air, like a bicycle tire? You must make your passengers comfortable if you want to catch the pleasure riders. A clean, yielding and cool air cushion seat and back would go a long way towards increasing the number of passengers you carry on a hot night.

Soft rubber mats in the aisle and on the steps of the car will add to the comfort and safety of the passengers. On the steps they will act as insulators, they will preserve the wood from wear and they may save many accidents by keeping the feet of passengers from slipping from the steps.

I have never heard it suggested before, but it seems to me that it would be a most excellent idea to connect every piece of metal work of a car to the ground, especially the hand and guard rails. Run a small copper wire from such metal pieces and connect it with some portion of the trucks. Make it all of the same potential as the ground, and then passengers getting on and off the car cannot receive a shock in any kind of weather.

Action of the Electric Current on Aluminum Wires.

The following article is from *La Nature* and is signed by M. Ch. Ed. Guillaume, although the first part appears to be due to Professor Margot. The translation was made by the London *Electrical Review*:

Amongst the singular properties that distinguish aluminum from other commoner metals, we may mention its very slight volatility at high temperatures. Although aluminum melts at a temperature intermediate between the points of fusion of zinc and silver, or at about 625 degrees, this metal may be brought to a white heat without appreciably evaporating, and without undergoing any extensive oxidation. At this temperature most metals less fusible than aluminum become considerably oxidized, or partly evaporated.

If a fine aluminum wire is traversed by an electric current sufficiently intense to heat it beyond its point of fusion, we find, contrary to all expectations, that it may be heated to a dazzling white heat and remain in this condition; this is quite contrary to what happens with other metals subjected to the same test, which, when their point of fusion is reached, break suddenly, each broken end presenting the form of a little metallic globule produced by the contraction due to the superficial tension of the liquefied metal.

Aluminum acts very differently; if the wire is first stretched between the two supports that convey the current, it curves inwards considerably; but it can remain for some time in a state of complete incandescence until the moment when the breakage takes place, which generally occurs near the points of attachment of the wire. The aluminum wire evidently consists of a liquid thread, oscillating at the slightest breath, and held in the air by the cohesion of its molecules, and probably, also, by the formation of a very thin skin of aluminum which acts as an infusible protecting sheath round the metal in fusion. This skin is in every case very thin, for a microscopic examination does not reveal any very manifest traces of oxidation. The appearance of the metal is rather that of a bar roughly melted, in which a disengagement of dissolved gas has occurred, similar to what takes place with silver. The surface is rough, though bright, and covered with little, well-defined craters, many erosions, and here and there blackish stains, resembling graphite. Moreover, the wire has become brittle, as if the metal had undergone a kind of crystallization. In the vacuum produced by an ordinary air pump, aluminum shows the same peculiarity of cohesion in a fluid state, but it seems to preserve more homogeneity than in the air. The same thing occurs if the experiment is made with carbonic anhydride.

The following table sums up some experiments performed in the air with aluminum filaments of different diameters and lengths. These figures are only approximate, for we could not deduce from them an exact proportionality between the intensity of the current and the resistability of the wire at the temperature of white heat, this intensity varying between somewhat wide limits, according to the length of the wire introduced between the supports, which have a very considerable disturbing influence on the measurements. It is easy to see that the aluminum rapidly gives up to the supports part of the heat disengaged, and for wires of decreasing length we shall require increasing intensities of current to bring them to the same temperature. (See table.)

We see, for instance, that an aluminum wire five millimeters in diameter and 10 centimeters long can bear an extraordinary intensity of current (about 31 amperes) when it is at white heat. The resistibility of the wire increases in considerable proportions, since, for the same wire, the difference of potential at the extremities, almost *nil* at the commencement, as long as the current does not reach a sufficient point to heat the metal appreciably, increases rapidly till it attains the value of five volts, when the wire is heated to a dazzling white. The resistance of the aluminum wire, calculated for a square millimeter of section and a meter in length, would be about .4 ohm, whereas when cold it is only .03 ohm.

Length of wire.	Diameter.	Intensity.	Difference of potential.
m.	mm.	amp.	volts.
.033	.17	7	4
.033	.40	22	2
.033	.33	17	2
.1	.50	31	5

RESULTS OF EXPERIMENTS.

This experiment, which is easily performed, consists in holding the extremities of the wire between two clamps and gradually increasing the intensity of the electric current up to the normal régime attained when the metal is quite luminous; *i. e.*, when it has the appearance of the filament of an incandescence lamp that is a little overrun, to put it too suddenly on short circuit, with all the intensity of current that the wire would be able to bear subsequently, would be likely to break it.

Moreover, the length of the aluminum wire may greatly exceed the above figures, although the fragility increases with the length of the wire. We have, however, succeeded in bringing to red heat wires 30 or 40 centimeters long, and, under these conditions, they have enabled us to give a definite, though transitory, form to the influence exercised by a magnet on a circuit traversed by a current (Fig. 1).

The wire, 25 to 30 centimeters in length and .3 millimeters in diameter, is fixed by its extremities to the supports that convey the current, so that at the bottom it can be formed into a loop almost closed and placed in a vertical plane. The loop being rendered incandescent by the passage of the current is extremely sensitive to the approach of a rectilinear magnet of average power, and according

to the nature of the current or the pole of the magnet brought into its vicinity, is violently repelled or attracted. Generally, and here it is that the experiment becomes most instructive, the repulsion changes into a sudden twist of the loop, which naturally has a tendency to present to the pole of the magnet that surface in which the direction of the current is such that an attraction can be produced. The experiment is of short duration, for, at this moment, the sudden movement brings into contact the middle parts, and consequently short circuits the upper ends of the filament, which break off under the action of the intense current.*

CHARLES MARGOT,

Professor at the University of Geneva.

The very interesting experiment just described, which we have repeated more than once since M. Margot was kind enough to communicate it to us, certainly owes its realization to the readiness with which aluminum becomes oxidized. Even at the ordinary temperature, in fact, this metal is covered with an adhering layer of aluminum, which protects it against other modifications, and explains several of its peculiarities. As this layer is pre-existant, an experiment *in vacuo*, or in a neutral gas, would only be conclusive if the metal was freed from it in the medium in which the experiment is prepared; for instance, by washing it with potash or a little diluted hydrochloric acid. The thickness of the layer is, moreover, slightly increased at high temperatures; in fact, we can still obtain a good electrical contact with an aluminum wire that has not been heated, whereas, after this operation, the contact becomes difficult and irregular. We know that it is the superficial oxidation that renders aluminum so difficult to solder; and all the methods of soldering this metal are based on scraping the surface and protecting it against the oxygen of the air. For turning operations, also, which are generally performed under some mineral spirit, protection against oxidation must be provided for, or the tools would soon be worn out.

It was this superficial oxidation that prevented Woehler from agglomerating the grains that he had first separated, so that he had to leave to Sainte-Claire Deville the actual invention of the first step in the metallurgy of aluminum.

We know, moreover, that a liquid cylinder, the length of which slightly exceeds three times the diameter, is unstable, and that the least bend very quickly becomes more pronounced under the action of the capillary forces, and in a very short time brings about the breakage of the cylinder. We may remember that on this very property a very curious instrument was based, Mr. Chichester Bell's hydraulic microphone, which we described a few years ago. From all this it follows that an aluminum wire, when heated to a temperature far above its point of fusion, only owes its stability to a kind of solid sheath, which completely encloses it, and prevents it from running together in drops; the low density of the metal moreover ensures the mechanical resistance of the chain that it forms between the two supports.

The first application that M. Margot attempted of the phenomenon that he had discovered is very interesting, and most effective for demonstration. It therefore deserves to be introduced into lectures on the subject whenever a current of 30 amperes is available.

The lightness of the aluminum wire and its liquid state render it sensitive to the slightest influence. For instance, when preparing the experiment we impart to the whole of the wire a very decided oscillating movement by the rotation of a rectilinear magnet placed at 50 centimeters, or one meter above or below

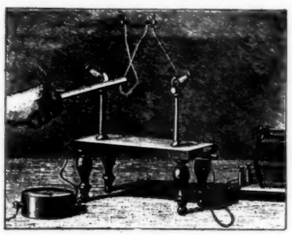


FIG. 1.—ACTION OF A MAGNET ON A CURRENT, DEMONSTRATED BY THE AID OF AN INCANDESCENT ALUMINUM WIRE.

it (Fig. 2). With a horse-shoe magnet we can deflect it from its position or twist it at will.

We can even go further than this; experiments with magnets are generally fairly easy, whereas the forces exercised by currents are more difficult to demonstrate. With an aluminum wire nothing is easier; if we convey the current by means of a vertical copper wire to an aluminum wire suspended from it, we can see the latter recoil sharply from its support as soon as it reaches a high temperature, whereas it falls back again as suddenly when the current is interrupted. The experiments that can be made with parallel wires are too evident for us to dwell upon them.

The brilliancy of the wire heated by a current renders all these experiments plainly visible to a large audience. This brilliancy which the wire

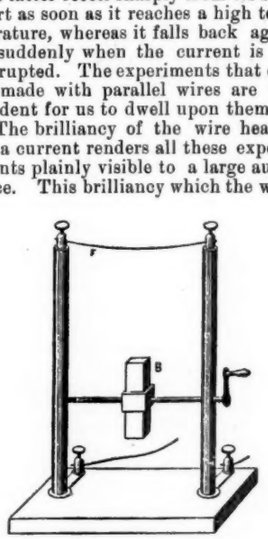


FIG. 2.—OTHER VARIATIONS OF THE SAME EXPERIMENT, THE PENDULUM MOVEMENT OF THE WIRE PRODUCED BY THE ROTATION OF A MAGNET.

assumes at a high temperature is no doubt heightened by phosphorescence of the alumina. This phosphorescence would even tend, from its very appearance, to make the temperature of the wire seem higher than it really was. Nevertheless, we must add that there can be no doubt as to its liquid state when it attains this dazzling whiteness.

The street railways of Peoria, Ill., have been operating under franchises providing that at the end of a certain time a stated percentage of the gross receipts should be paid into the city treasury. That time has about expired, and recently the city council met quietly and gave the roads new franchises running for 20 years, and leaving out the old provision as to gross receipts.

* These experiments succeed equally well, and with more certainty, with very fine platinum wires brought to incandescence, which, although less sensitive to magnetic influences, on account of their greater density, nevertheless show clearly, and under a very elegant form, the effects of attraction and repulsion due to the proximity of a magnet. It was, however, impossible for us to obtain clearly with platinum the curious turning round of the circuit so readily observed with aluminum.

TELEPHONE NEWS AND COMMENT.

On September 4 lightning burned out the telephone exchange at Indianapolis, Ind., causing a heavy loss.

The establishment of trolley lines on the main streets of Manchester, N. H., has made it necessary for the telephone company to install metallic circuits.

The manager of the Southern Michigan Telephone Company has asked the village council of Schoolcraft, Mich., for a franchise. It will probably be granted.

Springfield, Mass., people are said to be subscribing liberally to the stock of the local Standard Telephone Company, which proposes rentals of $3 and $2 per month.

The telephone company at Beaumont, Tex., has purchased wire sufficient for the construction of a telephone line from Beaumont to Warren and intermediate points on the Sabine & East Texas railway.

The Central Pennsylvania Telephone Company has installed a complete new exchange plant at Carlisle, Pa. The old outfit proved unequal to the demand created by a recent reduction in rates. There are 72 subscribers in Carlisle.

Thos. M. Ferguson, a well-known Mississippi contractor, has just turned over to the Meridian, Miss., & Tuscahoma, Ala., their 50-mile telephone line erected under his supervision. The Bell exchange in Meridian has made a small reduction in prices.

The output of the American Bell Telephone Company for the month ended August 20 is as follows:

	1895	1894	Increase
Gross output	11,009	5,689	5,320
Returned	8,730	6,537	2,199
Net output	2,279	def. 842	3,121
Since December 20:			
	1894-5	1893-4	Increase
Gross output	109,905	53,144	56,761
Returned	55,851	46,980	8,871
Net output	54,054	6,164	47,890
Total outstanding	636,560	572,655	63,905

The Mt. Vernon Telephone Company and the Central Union Telephone Company are having lively times with each other at Mt. Vernon, Ohio. The Board of Education ordered the janitor to remove from the superintendent's residence (for which he pays rent) the telephone furnished free by the Central Union.

The ELECTRICAL REVIEW acknowledges the receipt of an invitation from the American Telephone and Telegraph Company to be present at the opening of its long-distance lines connecting Louisville, Ky., with the principal eastern and western cities. The ceremonies occurred at the Board of Trade rooms between two and five P. M.

The fight is on hot at La Crosse, Wis. The new company claims to have 95 per cent of the old company's subscribers besides over 200 new ones. The new exchange of the La Crosse Telephone Company was opened for business on September 1 with 500 subscribers. The telephones used were manufactured by the American Electric Telephone Company, of Kokomo, Ind. The plant is owned locally and represents an investment of over $30,000; it is admitted to be one of the finest modern exchanges and was installed by the well-known telephonist, Paul W. Bossart.

A telephone war is threatened in McKeesport, Pa., and if all the statements that have been made are supported, that city will have a telephone service for almost nothing. The McKeesport Telephone Company has had its service in use about a year and a half, and at present has about 200 telephones in the city. The Bell company in the near future will introduce local service, which will include Pittsburgh. If the Bell company carries out this programme a lively slashing in rates is looked for.

A telephone war is on at Wabash, Ind. The Central Union company reduced its rates from $3 and $2 per month to $1 and 60 cents, for business houses and residences, respectively. The cut was precipitated by the home company, which is just completing its new system and which proposed to furnish services at $2 and $1.50, rates which the Central Union declined to accept. The home company has 130 three-year contracts and expects to make a successful fight against its old rival, which intimates that it will soon furnish service free.

The Vermont Telephone and Telegraph Company has been organized under a special charter from the legislature of the State of Vermont, with a full paid up capital stock of $50,000. Office at Montpelier, Vt., with A. C. Brown, president and general manager; and the company has lines diverging from Montpelier, Vt., into seven different counties in the State of Vermont, and the leases and contracts from the American Bell Telephone Company, heretofore held by A. C. Brown, have been transferred to the Vermont Telephone and Telegraph Company, and the new company starts out with about 500 subscribers and stations.

The United States on September 3 took an appeal in the Bell Telephone case, involving the validity of the Berliner patent. In the United States Circuit Court of Appeals, at Boston, Judges Colt, Putnam and Nelson sitting, Counsel J. J. Storrow for the appellant, in the case of the American Bell Telephone Company *vs.* the United States, made a motion for a mandate dismissing the bill brought by the United States in accordance with the decision of this court on the appeal of the Bell company. The court forthwith ordered the mandate to issue, whereupon Counsel Causten Browne, for the government, took an appeal in open court and the appeal was allowed. The appeal, it is said, takes the case before the U. S. Supreme Court and has the effect of superseding the mandate, leaving the case in *statu quo* to be heard anew by the court in Washington.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

SCHUYLKILL HAVEN, PA.—A six-mile railroad from this place to Pottsville, and another covering a similar distance from Minersville to Heckscherville and Taylorsville is to be built.

MILWAUKEE, WIS. — The Northwestern Railway Company has purchased 15 acres of land at Green Bay for freight yard purposes and will spend about $100,000 in improvements. A line will be built to connect all the large manufacturing plants.

KANSAS CITY, MO.—B. Korman has asked for a franchise from the city to construct a street railway from the terminus of the electric line to Korman's Park.

PITTSBURGH, PA.—It is said that the Second avenue electric line contemplates expending $1,000,000 in extending its lines to towns adjacent to this city.

DETROIT, MICH. — A company has been organized to build an electric railroad from this place to Port Huron, a distance of 65 miles.

BAGNELL, MO.—A syndicate proposes to build an electric railway from this place to Lebanon, by way of Gunter's Spring, in Camden County. The electricity will be generated by water-power at the Spring where a mammoth plant will be erected.

PEORIA, ILL. — The Fort Clark Electric Railroad of this city has passed into the hands of Columbus R. Cummings and Walter Barker, leading stockholders of the Central Railway.

SYRACUSE, N. Y.—The Syracuse Street Railway Company has bought the consolidated lines in this city.

CHICAGO, ILL.—Steam and Street Railway Employés' Hospital Association has been incorporated. Incorporators, A. M. Unger, F. E. Ellis and H. H. Rumbold.

WASHINGTON, D. C.—Mr. Thomas O'Hara, United States Minister at San Juan del Norte, Nicaragua, reports that money has been subscribed for the building of a railroad between the towns of Managua and Rama. The road will be 102 miles long and will open a fertile section. Mr. O'Hara also says there is much talk of the establishment of telegraph and telephone lines between Bluefields and Rama.

BUFFALO, N. Y.—The Lewiston & Youngstown Frontier Railway Company has been organized. Capital, $60,000. To operate a street surface road by means of horses, electricity, or any other motive power than steam. Directors: O. P. Letchworth, Frank M. Hayes, Henry C. Howard, A. J. Wheeler, Edwin T. Evans, L. D. Rumsey, F. R. March, Joseph L. Hunsicker, all of Buffalo, and A. H. Dutton, of Youngstown.

PITTSBURGH, PA.—The Pennsylvania company is said to be contemplating the introduction of electricity as a motive power on its main line from Union station to Stewart station.

TOLEDO, OHIO.—The contract for constructing the mammoth power house of the Toledo Traction Company was awarded to Mr. A. Bently.

HOBOKEN, N. J.—Col. E. A. Stevens, president of the Hoboken Railroad, Warehouse and Steam Connecting Railway Company, has made application to the Hoboken Common Council for permission to build an electric railway along the river front, to afford direct connection between the steamship docks and the railroads.

INDIANAPOLIS, IND.—The Greenwood electric road is to be constructed. Contracts to be let and work to commence at once. Arrangements have been made to enter the city at Shelby street and cross the viaduct.

WOOSTER, OHIO.—The Wooster, Medica & Cleveland Street Railway Company has been incorporated by L. P. Obliger, J. R. Zimmerman, A. Cunningham, C. V. Hard and others.

ST. LOUIS, MO.—A $15,000 car shed will be erected at Jefferson and La Salle streets.

CALUMET, ILL.—The Calumet Electric Street Railway Company has secured control of the Englewood & Chicago Electric Railway by guaranteeing the interest on $200,000 of its bonds.

NEVADA, MO.—The new Nevada Electric Railway, Light and Power Company has been organized with a paid-up capital stock of $130,000 and will apply for a charter next week. The company will be composed of George Dudley, Judge Mills, Selden Spencer, F. T. Allison and Dr. T. F. Prewitt, all of St. Louis; C. F. Strohm and Colonel Harry Moore, of Nevada.

Electric Light and Power.

LENKERVILLE, PA.—This place is soon to have electric lights.

JASPER, IND.—A franchise has been granted to a local electric light company and the city is to be lighted by electricity in 60 days.

MIDDLETOWN, CONN.—A proposition is being discussed to have the town establish a plant and furnish its own electricity for street lighting.

HERMANN, MO.—Hermann Electric Light Company has been incorporated. Capital, $8,000.

EATON RAPIDS, MICH.—This place is to have electric lights.

BROCTON, PA.—Citizens of this place will vote on the proposition to establish a municipal electric light plant.

SING SING, N. Y.—The Sing Sing Electric Light Company is enlarging its plant by putting in an additional boiler, a new engine and dynamo.

DULUTH, MINN.—The contract has been awarded for waterworks and electric lights to Fairbanks, Morse & Company on a bid of $25,000.

SHARON, CONN.—An electric plant is to be established here to furnish lights for that town and adjoining places.

BUTLER, PA.—A charter is being applied for by Hon. D. D. Phillips, of Gordon; Dr. C. S. W. Schomo, of Ashland, and Andrew Comrey, Ephraim Barlow and Harrison Ball, of Mahanoy City, as incorporators of a new corporation to be known as the Butler Light, Heat and Power Company.

HUNTINGTON, PA.—Owing to the enlargement of the reformatory buildings, the electric light plant has been increased. Contracts have been let for the engines to the Ball Engine Company, of Erie; for the incandescent dynamos to the General Electric Company, of New York, and for the arc dynamos to the Brush company of Cleveland.

MCGREGOR, IOWA.—The McGregor Electric Light and Power Company has been incorporated with $10,000 capital.

PALOUSE, WASH.—G. F. Wellis is installing an electric lighting plant here. He would like to hear from manufacturers of supplies.

OSCEOLA, IOWA. — The Osceola Electric Light Company has been incorporated with a capital stock of $20,000, to operate electric light and power plants at Osceola.

MAHANOY CITY, PA. — The Butler Light, Heat and Power Company; charter is being applied for by Hon. D. D. Phillips, of Gordon; Dr. S. C. Schomo, of Ashland, and Andrew Conrey, Ephraim Barlow.

STONINGTON, CONN.—The electric light plant at the factory of the Atwood Machine Company is to be increased by the addition of 100 lights and another dynamo. The entire building is also to be rewired.

CONWAY, ARK.—Prof. G. H. Burr has organized an electric light company, and proposes to light Conway by November 1.

SPRINGFIELD, MO.—A movement is on foot to have an electric light tower built in the center of the square so that the business portion of the town can be thoroughly lighted.

New Telephone and Telegraph Companies.

MENOMONIE, WIS.—A complete telephone system is to be put in. The entire outfit has been ordered from the Standard Telephone and Electric Company, of Madison.

MELROSE, MASS.—A permit was granted to the Century Telephone Company to construct its lines. The company has already secured over 100 subscribers.

CANANDAIGUA, N. Y. — The Postal Telegraph Company is to establish an office here. It is understood that F. G. Hulse will be the local manager.

GREENWOOD, IND.—The Greenwood Telephone Company, with a capital stock of $3,000, has filed articles of incorporation. The incorporators are Grafton Johnson, J. F. Crawford and Albert Johnson. The company proposes to establish a telephone system in Greenwood.

SACRAMENTO, CAL.—The Capital Telephone and Telegraph Company has begun business at this place and now has 300 'phones in operation in the city.

COLUMBUS, OHIO. — The Interstate Telegraph and Telephone Company has been incorporated by P. J. McCaffrey, George S. Thompson, Charles J. Ewin, Thomas Thompson and Matthew A. McGrath. The object is to construct, own and operate telegraph and telephone lines in the States of Ohio, West Virginia and Kentucky, and doing a general telephone business with offices in Columbus. The capital is $10,000.

TOPEKA, KAS.—A number of business men are perfecting plans whereby a new company will be organized here with a capital stock of $200,000, to be known as the National Long-Distance Telephone Company.

FARGO, N. D.—The telephone line between this place and Wild Race was demolished by the wind.

MADISON, IND. — The Madison Telephone Company; capital stock, $10,000; has filed articles of incorporation.

GARRISON, COLO.—The Garrison & Duncan Telephone Company has been incorporated with a capital stock of $5,000 by Paul B. Gates, Wesley Staley, Charles R. Foster, Larin O'Ray, to operate in Garrison, Costilla County.

BYRON, N. Y.—This place is soon to have a telephone line established, which will connect the town with the counties of Erie, Wyoming, Livingston, Monroe, Orleans and Niagara.

PHILADELPHIA, PA.—Gen. James S. Clarkson and A. T. Nye have filed articles of incorporation at Camden for the Standard Telephone and Telegraph Company, of Philadelphia. Capital stock, $250,000.

New Manufacturing Companies.

MILWAUKEE, WIS.—Duerr & Rohn, electricians; firm changed to Rohn & Meyer. The new firm will give its entire attention to electrical contracting, etc.

PORTLAND, ME.—L. A. Chase & Company has been organized for the purpose of buying and selling all kinds of electrical apparatus and appliances. Capital stock, $50,000. President, Josiah H. Drummond, Jr., of Portland.

Business Troubles.

NEW YORK, N. Y.—An attachment for $12,000 has been issued against the Union Telegraph and News Company in favor of the Kiernan News Agency.

Facts for Advocates of Electric Killing.

[From the Rochester, N. Y., Post-Express.]

The accident to Harry W. Sherman ought to settle definitely the correctness of the theory, put forward by electricians some time ago, that apparent death from electric shock may be nothing more than suspended animation.

The theory was so bold and strange a one that nothing but respect for the general knowledge and the specific experience of the electricians who maintained it made it seem credible when first suggested to us; but the Grover case seemed conclusive. At the Rochester Gas and Electric Works he received a heavy current of electricity and was seemingly dead for nearly an hour; but his comrades worked faithfully over him and restored him to consciousness. Yesterday, at the same place, Mr. Sherman received a very heavy shock, precisely how heavy is a matter of conjecture; but certainly heavy enough, so far as appearances went, to kill him; and his comrades, under the direction of Superintendent Redman, went to work at him skillfully and restored him in six minutes. During that time he was virtually dead, and if no steps had been taken to resuscitate him he would have been actually dead in a short time.

These two cases occurring among us remove this matter beyond the sphere of speculation. What is the use of the old theory that an electric shock kills when a man like Superintendent Redman, familiar with electricity in a practical way from boyhood, quietly sets his employés to work, as a matter of course, on an apparently dead comrade and brings him back to life? The plain facts are that a heavy electric shock may kill and may not kill, and that the only way to know whether he is killed or not is to apply the test of an attempt at restoration. All theories at variance with these facts must go.

National Association of Manufacturers.

By direction of the Executive Committee, the date for holding the annual convention of the National Association of Manufacturers, at Chicago, Ill., has been changed to November 19, 1895.

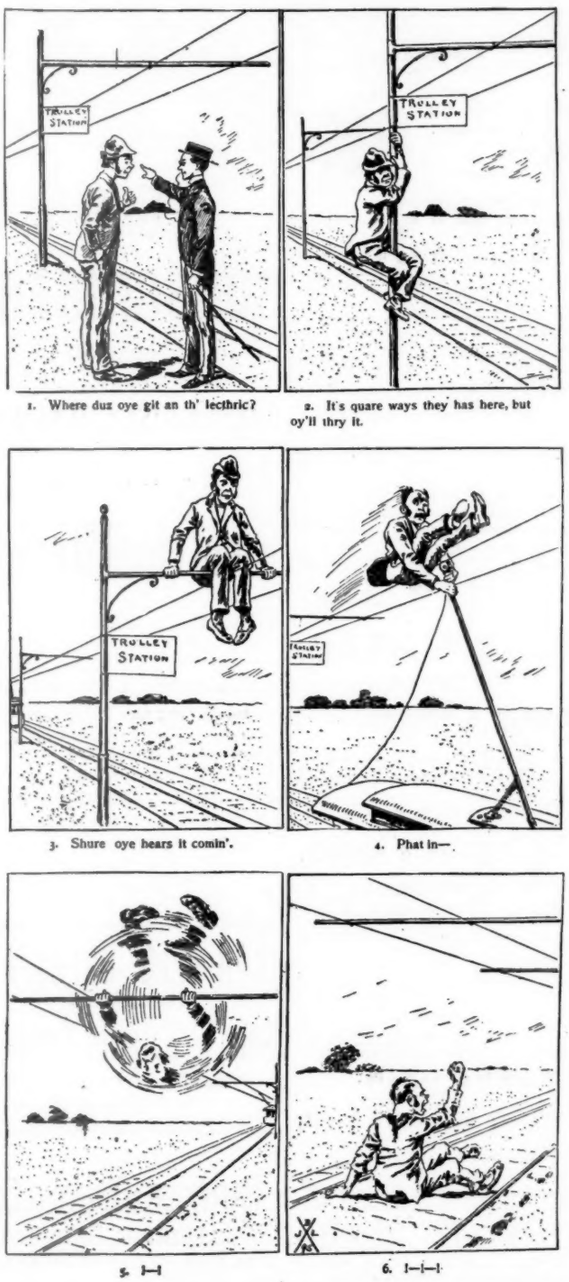
The Wisconsin Telephone Company has secured a franchise for the construction of lines at Wausau, Wis.

A Combined Telephone and Telegraph System.

The Mexican Telephone Company have recently established a telegraphic service in connection with their telephone business in the Federal District, which will no doubt prove of great convenience to their subscribers and to the public as well, says the *Mexican Financier*. Parties having telephones when desirous of sending messages to those who have none, can do so from their stations by calling up the director of communications, who will receive same and forward them to their destination with despatch. Those who have no telephonic connection can send messages through the public stations, situated in all the principal sections of the city, or through any subscriber's telephone, provided the permission from him is first obtained. The rate charged is exceedingly small, only enough to cover the extra expense incurred by the company. The company already has its lines in all the towns of the Federal District and are now prepared to carry out the above service. By special arrangement with the Federal Telegraph Company, the company will accept telegrams in the different towns of the Federal District to any point in the Mexican Republic, thus saving time and expense to parties who are situated outside of the city. These telegrams will be forwarded to their destination only by the Federal Telegraph Company.

MIKE'S TRIP ON THE TROLLEY.

[*From Truth.*]



1. Where duz oye git an th' lecthric?
2. It's quare ways they has here, but oy'll thry it.
3. Shure oye hears it comin'.
4. Phat in—.
5. ⊢⊣
6. ⊢⊣⊢

The Buffalo Bill Portable Electric Lighting Plant.

TO THE EDITOR OF ELECTRICAL REVIEW:

My attention has been called to an article in the *Electrical Engineer* of August 21, describing the two portable electric lighting plants now in use by the Buffalo Bill Wild West Company, in which credit for design and manufacture is given to the Ball company and others.

The facts are, the Ball company had nothing whatever to do with either the designing or construction of these plants, and were skeptical as to their successful operation. An article in the ELECTRICAL REVIEW for May 1, 1895, and, in fact, all the Buffalo Bill posters, give the writer credit for the design and construction of these two highly successful plants. I am not seeking vain glory, but I would thank you to publish these well-known facts.

The author of the *Engineer's* article is unknown to me, and I am at a loss to understand where he ob'ained this misinformation.

Yours truly,

THOS. H. LEWIS.

New York, August 31, 1895.

The Brooklyn Heights Railroad Company, of Brooklyn, N. Y., makes the following report for the quarter ended June 30: Gross earnings, $1,086,083; operating expenses, $736,201; net earnings, $349,881; other income, $59,852; gross income, $409 734; fixed charges, $540,863; deficit for the quarter, $131,129; cash on hand, $73,726; profit and loss (deficiency), $547,086. The net income for the same quarter last year was $17,235.

SPECIAL ANNOUNCEMENT.

The demand for good men in the many branches of electrical work is again noticeable.

The ELECTRICAL REVIEW desires to aid all who are out of employment in this field, and will publish from now until October 1 all announcements of "Positions Wanted" at *one-third* the regular rate.

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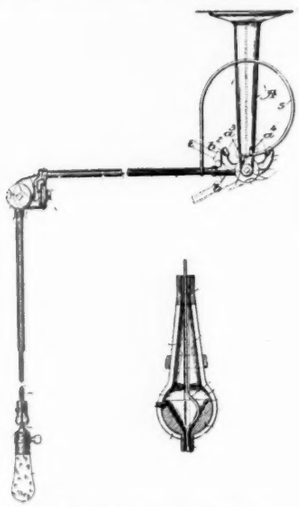
ELECTRICAL PATENTS

ISSUED SEPTEMBER 3, 1895.

545,469 Electrical signaling apparatus; J. H. Fildes, Chicago, Ill.

545,485 Adjustable support for electric or other lamps; L. Goddu, Winchester, Mass.—A standard, a stem pivoted thereto, and limiting stops therefor and a lamp supported by the stem, and a counter-balancing spring to act upon the stem.



No. 545,485.—SUPPORT FOR LAMPS.

545,494 Railway block signaling system; A. W. Hall, New York, N. Y.—A block signal, a circuit closer with an automatic supplemental signal for said block signal, and a normally closed circuit including a track instrument.

545,495 Support for overhead electric conductors; M. Hanford, Springfield, Mass.

545,498 Electric brake; W. L. Hendenberg, New York, N. Y.—A bar having a plurality of coils immovable relatively to the bar and adapted to be drawn toward the wheels, together with a controller adapted to throw one or more coils into circuit at a time.

545,520 Trolley guard; J. T. Moody, Springfield, Ohio.—A trolley having lateral guards and a latch guard journaled to one lateral guard and normally projected across the space between the said lateral guards.

545,524 Electric motor; J. O'Neil, New York, N. Y.

545,553 Electric igniting apparatus for gas engines; H. Thau, New York, N. Y.

545,554 Alternating current generator or motor; E. Thomson, Swampscott, Mass.—An armature having a series of windings which are alternately reversed, and a field magnet having poles each subdivided into separate polar projections.

545,569 Electric tool and machine; H. H. Bliss, Washington, D. C.—A carrier, and a motor having a hollow armature around the carrier, a solenoid or magnet and a core arranged around the carrier.

545,570 Electric coal drill; H. H. Bliss, Washington, D. C.—A field magnet, trunnions supporting the field magnet, power mechanism, and the driven mechanism, connected to said field magnet.

545,591 Electric motor; O. E. Kramer, St. Louis, Mo.—A series of field magnets supported on an inner diamagnetic ring and having their outer poles connected by means of a paramagnetic ring.

545,592 Electric motor; O. E. Kramer, St. Louis, Mo.

545,620 Cleat for electric wires; M. M. Wood, Chicago, Ill.—A body having a slot, the opening of which is substantially parallel with the length of the wire, and which is curved within the cleat so as to form a hump or bend on the wire to prevent its longitudinal motion.

545,629 Safety appliance for electric conductors; A. E. Hutchins, Detroit, Mich.

545,637 Teletyper; C. Spiro, New York, N. Y.—A type writing machine, a contact arm pivotally supported on its lever and extended above and below said lever, a co-operating electric signal-producing device located above the lever, a co-operating mechanical arm (contact) controlling device.

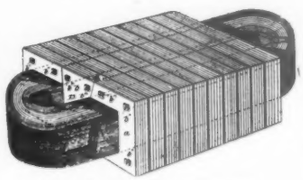
545,649 Trolley arrester; H. F. Hilderbrandt, Rochester, N. Y.

545,653 Electric alarm; W. S. Hull, Dallas, Texas.

545,664 Method of and apparatus for controlling current for electric motors; T. Zweibergk, Cleveland, Ohio.

545,670 Electric transformer; W. F. Brittin, Allegan, Mich.

545,686 Trolley; Z. T. Furbish, Augusta, Me.—A forked rod, depending arms secured



No. 545,670.—TRANSFORMER.

thereto, and a trolley wheel journaled between said arms, and being adapted to incline laterally in relation to the same.

545,693 A synchronous motor; M. Hutin, Paris, France.

545,694 Electric arc lamp; R. H. Jahr, Opladen, Germany.—An adjustable auxiliary resistance for changing the action of the regulating helix, and a connection between the said auxiliary resistance and the main regulating resistance.

545,696 Electric time check receiver; C. K. Jardine, Georgetown, British Guiana.

545,699 Electrical annunciating target; O. Kauffman, Sacramento, Cal.

545,717 Illuminated sign for street cars; H. Pearson, Springfield, Mass.

545,726 Indicator; B. F. Rittenhouse, Philadelphia, Pa.—A tube, a coil surrounding same, a stationary core within the upper portion of said tube, a vibrator within the lower portion of said tube, a seat for said vibrator and a push button.

545,736 Electric arc lamp; R. Segerdahl, Chicago, Ill.

545,755 Carbon holder for electric arc lamps; T. E. Adams, Cleveland, Ohio.—A fixed jaw having recesses in its sides, a movable jaw, a yoke projecting from the movable jaw and extending through the recesses to a point in rear of said fixed jaw, and a thumb screw.

545,806 Trolley wire support; J. W. Meaker, Evanston, Ill.—A hanger having an inclined upper edge, a clip having also an inclined upper edge, said clip being adapted to receive said hanger and to be wedged thereupon.

545,815 Electric signaling apparatus; B. Price, Baltimore, Md.

545,819 Electric insulator; D. M. Rothenberger, Lancaster, Pa.—An insulator having transverse grooves and a central perforation through which binding wires pass to hold in place the main conductor.

545,833 Bond for electric railways; E. S. Wheeler, Saugatuck, Conn.

545,835 Electric burglar alarm; J. R. Alexander, New Albany, N. Y.

545,853 Rotary field motor; A. E. Reymond, Berlin, Germany.

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REFERENCES: D. N. Morgan, U. S. Treasurer; John Goode, ex-Solicitor Gen'l U. S.; Capt. L. G. Parker, U. S. Army; A. B. Duvall, Dist. Attorney for District of Columbia.
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